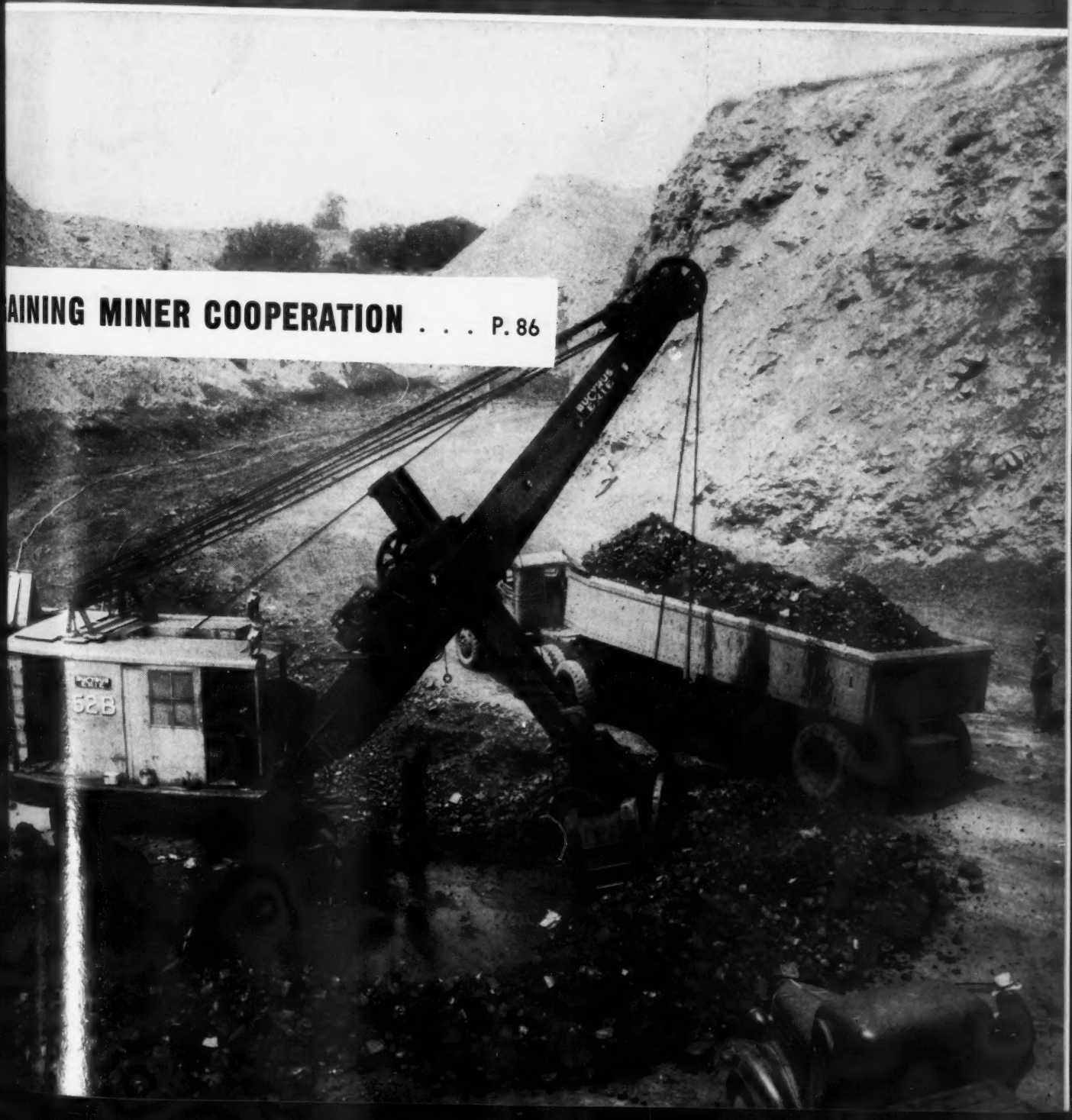
TECHNOLOGY

Coal Age

DECEMBER, 1945



AINING MINER COOPERATION . . . P. 86

ELIMINATES 85% OF CAR-LUBRICATING JOBS

SUN MINE LUBRICANT...

Ends Constant Oiling of Car-Bearings in Pennsylvania Mine, Stays Soft, Does Not Separate

For years, this mine struggled with a famous brand of grease . . . but one which separated or hardened in a short time. Too soon after it was applied, bearings were getting practically no lubrication; cars were hard to push; oil had to be added.

When a Sun Engineer was handed this problem to solve, he recommended a grease specially made for mine-car conditions by Sun Oil Company, one of the country's oldest and largest grease manufacturers.

The experience behind this grease proved out. In use for three years, it does not separate, harden, or wash out. Even when cars are brought outside the mine in zero weather, Sun grease keeps them rolling easily.

Maintenance-crews now grease the car-bearings every three or four months, completely eliminating 85% of the former bi-weekly lubricating jobs.

In hundreds of mines, this is the kind of service which Sun Mine Lubricants are giving . . . not only in car-bearings, but in every type of machine from the biggest power-units, hoists, and conveyors, right down to the smallest motors and drills. For reliable petroleum products, for reliable service, call the Sun man near you, or write . . .

SUN OIL COMPANY • *Philadelphia 3, Pa.*
Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

FOR MORE THAN 50 YEARS OF SERVICE
This Brand Name was Awarded the GOLDEN ANNIVERSARY CERTIFICATE by the
EDISON NAMES RESEARCH FOUNDATION, Inc.

SUNOCO

SUN INDUSTRIAL PRODUCTS
OILS FOR AMERICAN INDUSTRY

In war or peace
B.F. Goodrich
FIRST IN RUBBER

LIBRARY
DEC 28 1945
DETROIT

Photo courtesy U. S. Bureau of Reclamation

A mountain rides on a rubber roller coaster

A typical example of B. F. Goodrich improvement in rubber

CALIFORNIA'S Shasta Dam weighs millions of tons, is 560 feet high. To build it, a mile-long roller coaster carried a mountain of sand and rock up hills and down valleys to the dam site. When belts broke down, hundreds of men, waiting for their cargo, were idle. Some of the belts tried on this big job did fail, but they were replaced by belts like the one in the picture — B. F. Goodrich cord belts — not one of which broke down in service.

Dumping tons of sand and rock on a moving conveyor belt naturally wears, cuts, and finally tears ordinary belt. Then the whole system has to shut down for repairs.

To avoid such delay and cost, B. F. Goodrich engineers developed an entirely new belt design. The usual "carcass" of fabric (which has to "stand and take" the shock) is replaced in this new belt by hundreds of individual cords, each imbedded in flexible rubber. When rock hits this B. F. Goodrich belt, the cords can "give," and so absorb the shock.

This new B. F. Goodrich cord belt has lasted 10 times as long as other belts on many jobs. It offers thousands of companies an entirely new low cost in the transporting of materials.

Ask your B. F. Goodrich distributor about it for your jobs, and you'll see another example of the constant B. F. Goodrich research that continually improves rubber products and reduces users' costs. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

RUBBER *and* SYNTHETIC *products*

First in its Field .....

AS GRANDFATHER USED TO SAY—

"Merry Christmas!"

Here are examples of the first Christmas Cards published in America. They were printed by Louis Prang, an exile from Germany. In 1856 he founded a small lithographic business in Boston, where he perfected a process of multi-color printing which he called Chromos . . . and shortly thereafter our grandparents, perhaps our great-grandparents, exchanged their holiday greetings in the shape of Prang's chubby cupids, classic monuments and "earth's choicest flowers." To which good old American sentiments the makers of "earth's choicest grease" (Hulburt Quality Grease for coal mine lubrication) can really add nothing . . . so, in the spirit of Yuletide, we simply re-echo the old yet ever-new wish: "A Merry Christmas and a Happy New Year!"

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PENNA.

Specialists in Coal Mine Lubrication

. . . . . a record of

American Leadership

HULBURT

Quality

THE "FIRST NAME" IN

GREASE

BATTERY POWER IS SAFE

"The Bureau does not have a record of an explosion or a mine fire caused by permissible storage-battery locomotives that have been maintained in permissible condition."

U. S. Bureau of Mines
Information Circular I. C. 7302
November, 1944

Quoted by Permission

The new Philco "Thirty", with 30% longer life, is identified by its distinctive red connectors.

Tune in The Radio Hall of Fame, with Paul Whiteman and His Orchestra, Sundays, 6 P. M., EST — ABC (Blue) Network (Coast-to-Coast).

★

FOR 50 YEARS A LEADER IN MINE STORAGE BATTERY DEVELOPMENT

Greater safety is one of the major reasons for installing battery-powered haulage equipment. Especially so, when you consider the low cost, ease of maintenance and long life of modern high-capacity Philco Mine Batteries. The new Philco "Thirty" with 30% longer life, has introduced a new era in low cost per ton hauled with battery-powered locomotives and shuttle cars. Write for the facts today.

PHILCO CORPORATION • STORAGE BATTERY DIVISION • TRENTON 7, NEW JERSEY

PHILCO

Famous for Quality the World Over

Coal Age

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330 West 42d St., New York 18, N. Y.

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Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

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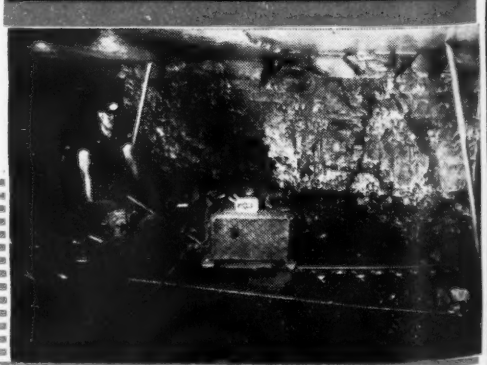
"THE NON-EXPLOSIVE MINING METHOD"

FOR MORE AND

BETTER OUTPUT WITH

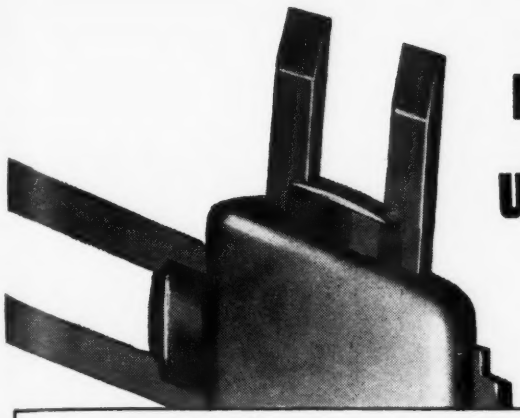
ALL MECHANIZED EQUIPMENT

The value of CARDOX in making the most of mechanized equipment extends over practically every phase of production. Longer cutter bars can be used when the face is broken down with CARDOX . . . providing more coal *per face* for the loading machine. Loading is faster . . . and the loader is subjected to less wear . . . because the slow heaving action of CARDOX rolls the coal forward in a loose pile. The higher percentage of coarse sizes produced by the gentle heaving action of CARDOX makes possible substantial savings in cleaning time and cost. ¶ The CARDOX Mining method involves no radically new procedure. In fact, it makes possible maximum output with a minimum of skill and manpower. Write for full details on free demonstration in your own mine.



CARDOX
Hardsocg Drilling Equipment
Complete line of drilling equipment designed to give you the maximum in drilling efficiency

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS



BETTER DRILLING *Begins* WITH COALMASTER BITS

No drill is better than its bit. It pays to standardize on Coalmaster Drill Bits—scientifically designed to cut cleaner, faster, and last longer.

They are stocked in a wide variety of lengths and cross sections—single or double edge—chisel or diamond point—medium or hard temper—borium tipped or plain, for every drilling operation.

Cross section and length in Columns 1 and 2, the bit number in 3. Reading across 4 to 9, you can readily see characteristics of each bit.

1 2 SIZE		3 BIT	4 5 EDGE		6 7 POINT		8 9 TEMPER	
Cross Sec.	Length	Number	Single	Double	Chisel	Diamond	Medium	Hard
¼ x ¼	2 1/16	60	x		x		x	
		56		x	x			x
		57		x	x		x	
¼ x ¼	2 ⅛	54	x		x			x
		54F	x		x			x
¼ x ¼	2 ¼	53	x		x			x
		62	x		x		x	
		51		x	x			x
		63		x	x			x
		64		x	x		x	
		50H	x			x		x
		50	x			x	x	
¼ x ¼	2 ½	52	x		x			x
		55		x	x			x
		49	x			x	x	
¼ x 5/16	2	43	x		x			x
		43F	x		x			x
¼ x 5/16	2 ¼	42		x	x			x
		46	x		x			x
¼ x 5/16	2 ⅜	44		x	x			x
		47	x		x			x
		47F	x		x			x
¼ x 5/16	2 ⅜	45		x	x			x
5/16 x 5/16	2 ¼	85	x					x
		91		x				x
5/16 x 5/16	2 ⅜	81		x				x
		86	x		x			x
5/16 x 5/16	2 ½	76		x	x			x
		87	x		x			x
5/16 x 5/16	2 ⅝	82		x	x			x
		88	x		x			x
5/16 x 5/16	2 ¾	83		x	x			x
		89	x		x			x
5/16 x 5/16	3	84		x	x			x
		90	x		x			x
⅜ x ⅜	2 ⅝	69	x		x			x
		69FB	x		x			x
⅜ x ⅜	2 ¾	66		x	x			x
⅜ x ⅜	3	58		x	x			x
		70	x		x			x
⅜ x ⅜	3 ¼	67	x		x			x
		67F	x		x			x
⅜ x ⅜	3 ½	68		x	x			x
½ x ½	2 ½	71	x		x			x
½ x ½	2 ¾	72P	x		x			x
		72F	x		x			x
		75	x		x			x
½ x ½	3	73		x	x			x
		74	x		x			x
		78	x			x		
½ x ½	3 ¼	77	x			x		x

TABLE FOR SELECTION OF COALMASTER DRILL BITS

- *Please Order by Number for Immediate Shipment*

Information on special bits for all purposes furnished on request.

DRILLING COALMASTER TOOLS

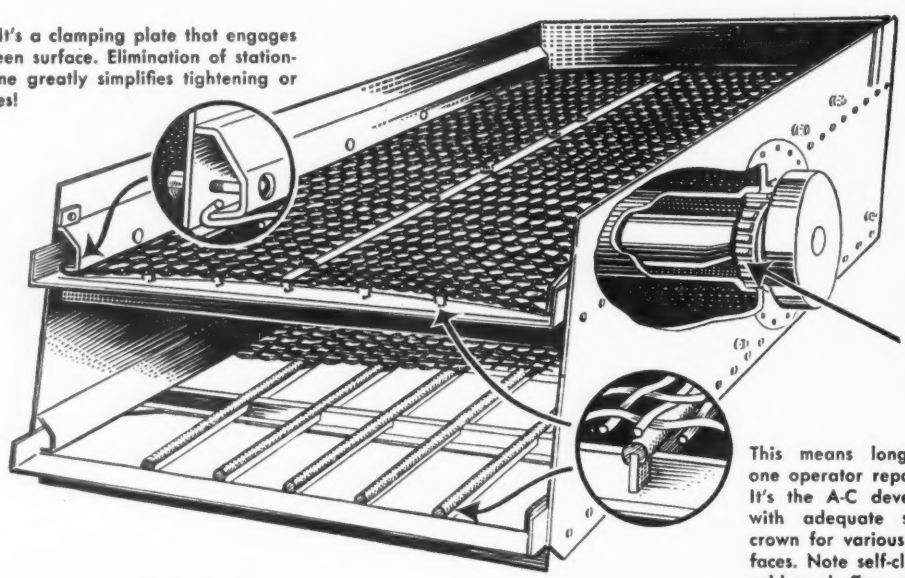
CENTRAL MINE EQUIPMENT CO.

ST. LOUIS 8, MO.

"Low Cost--High Capacity!"

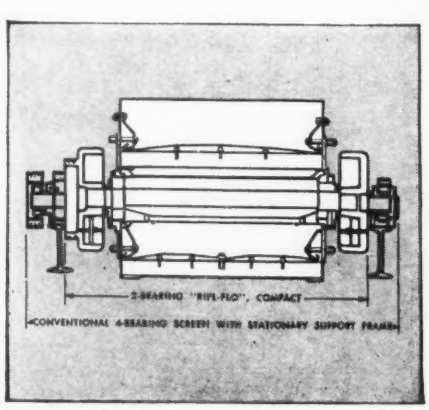
THAT'S THE STORY IN A NUTSHELL ABOUT AMERICA'S NO. 1 VIBRATING SCREEN--THE "RIPL-FLO"!

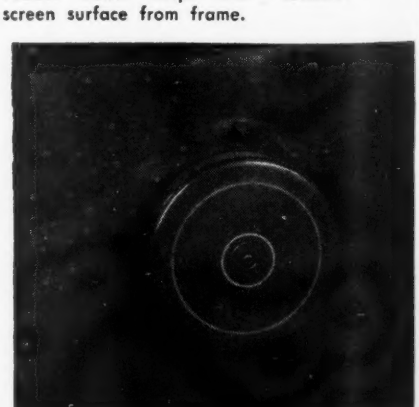
This saves time! It's a clamping plate that engages and tensions screen surface. Elimination of stationary support frame greatly simplifies tightening or changing surfaces!



This means low initial cost, low power consumption, low maintenance! Only 2 bearings are required to impart perfect circle motion to screen surface and body!

This means longer wire cloth life—one operator reports up to double life! It's the A-C developed support frame with adequate strength and proper crown for various grades of screen surfaces. Note self-clamping, wear-resisting rubber buffer strips that "cushion" screen surface from frame.

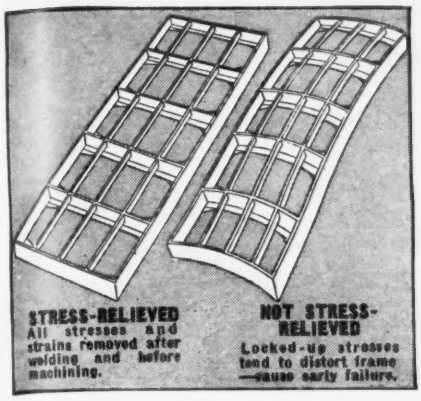




1 Fact is, 2-bearing "Ripl-Flo" *costs less* than any comparable 4-bearing screen—yet does as good *or better* screening job! One reason we can build it for less, pass savings to *you* is that . . .

2 Extra outer bearings, stationary support frame, *all* superfluous parts are eliminated — reducing width 17%, weight 36%! This, coupled with *perfect balance*, cuts amount of power required.

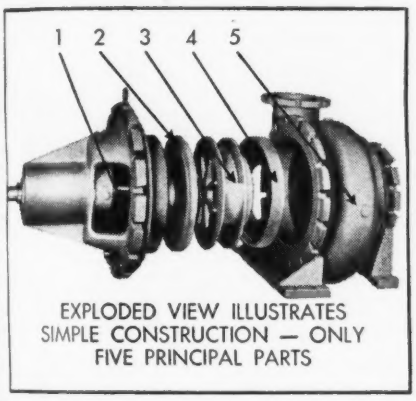
3 Yes, Ripl-Flo's perfectly balanced mechanism means *smooth* performance, *uniform travel* of material over entire surface, *rapid stratification* of bed, *full capacity!* Want *low* maintenance?


STRESS-RELIEVED
All stresses and strains removed after welding and before machining.
NOT STRESS-RELIEVED
Locked-up stresses tend to distort frame —cause early failure.

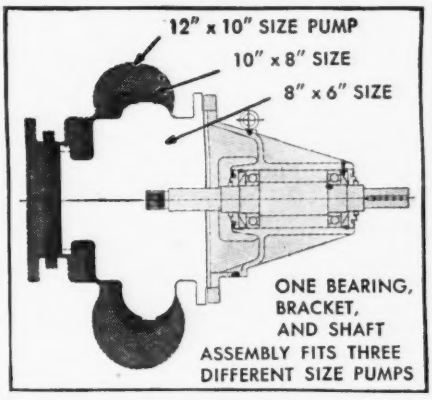
4 Screen body is high tensile strength alloy steel (up to *50% stronger* than regular steel). All welded parts are "stress-relieved" to *eliminate* structural failures—give *extra years* of screen life!

5 Before it can go out to do a job for you, every "Ripl-Flo" screen must pass a tough, 2 hour "exam." Running in a special test rig, it's checked for throw, balance, bearing temperature, etc.

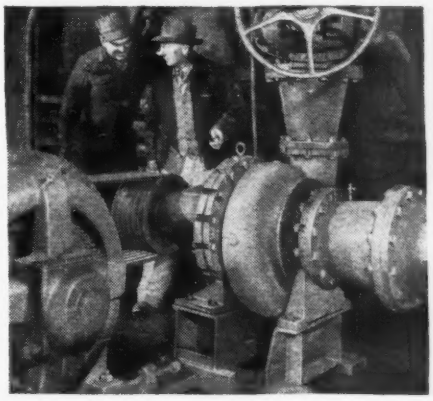
6 The customer gets his *choice* at A-C—can select from 8 *different* types of screens! Want more details on *modern, up-to-date* Ripl-Flo—1 to 4 decks? Send for Bulletin B6151B.



7 Another A-C help is the new "Solids-Handling" pump—that promises *2 to 4 times longer life* —cuts parts inventory *much as 2/3—materially* reduces down-time! It's so designed that . . .



8 You can remove entire rotating element *without* disturbing piping—take apart, re-assemble entire pump fast as ½ *hour!* And, it is comparable in price to ordinary high efficiency pumps.



9 Here's what one operator reports: "Downtime cut 400%; power savings $7 day; parts inventory cut 70%!" Want a *new low cost* per ton of solids pumped? Get Bulletin B6381.

GET THIS "TEAM-UP" FROM ONE SOURCE!

Equip your plant with *basic* machinery *plus* economical power equipment to *run* it—get it all from *1* company! Yes, A-C not only builds screens, crushers, grinding mills, kilns, etc.—but also power generation, distribution and control equipment—motors, pumps, blowers, compressors, Texrope V-Belt drives—*over 1600 different products for you!*

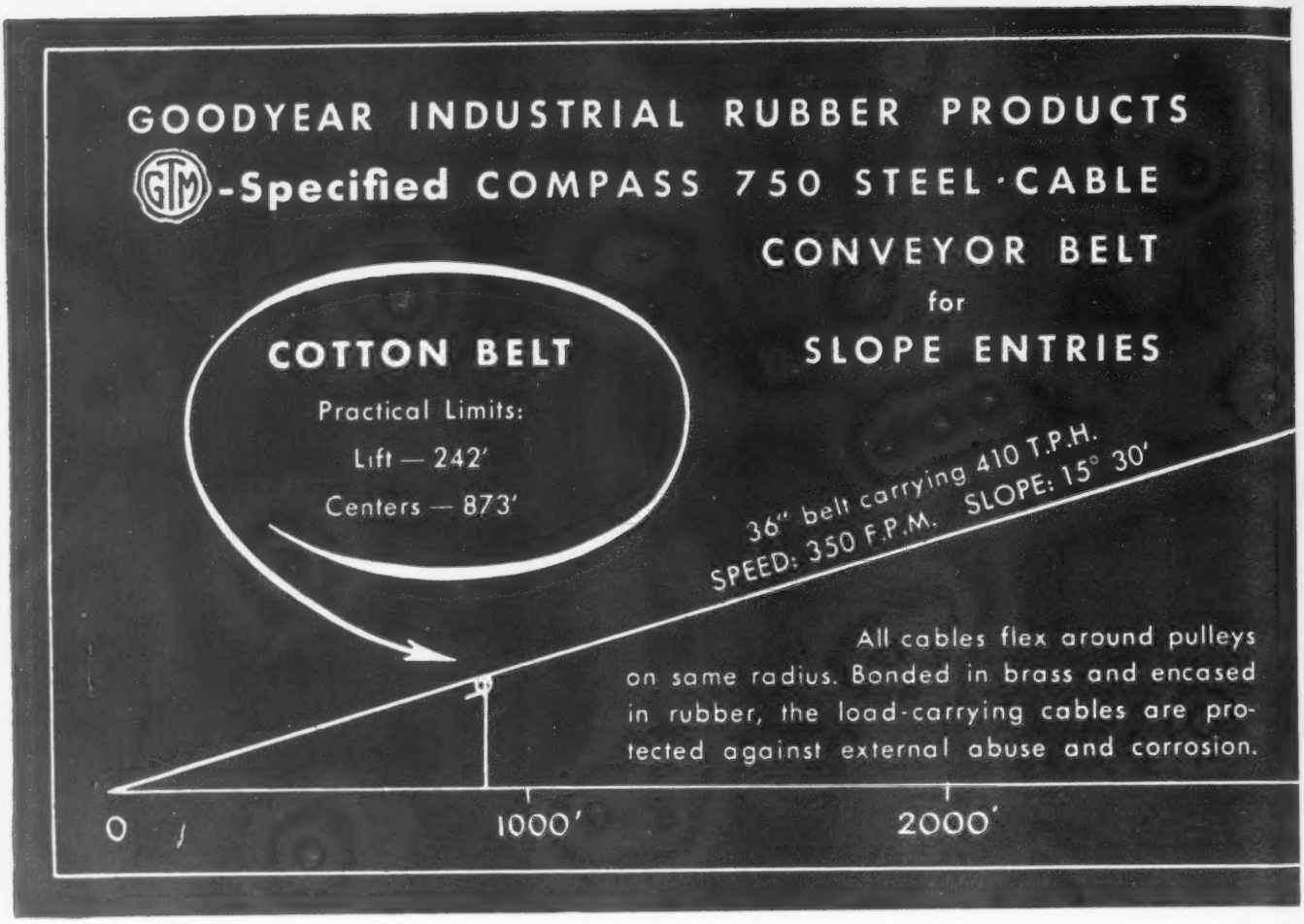
A-1968

ALLIS-CHALMERS

PRODUCER OF WORLD'S LARGEST LINE OF CRUSHING, CEMENT & MINING EQUIPMENT!

A-C

MILWAUKEE, WISCONSIN


GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified COMPASS 750 STEEL-CABLE CONVEYOR BELT
for
SLOPE ENTRIES
COTTON BELT
Practical Limits:
Lift — 242'
Centers — 873'
36" belt carrying 410 T.P.H.
SPEED: 350 F.P.M. SLOPE: 15° 30'
All cables flex around pulleys on same radius. Bonded in brass and encased in rubber, the load-carrying cables are protected against external abuse and corrosion.
0
1000'
2000'

Now comes the STEEL CABLE conveyor belt

with revolutionary advantages in slope haulage!

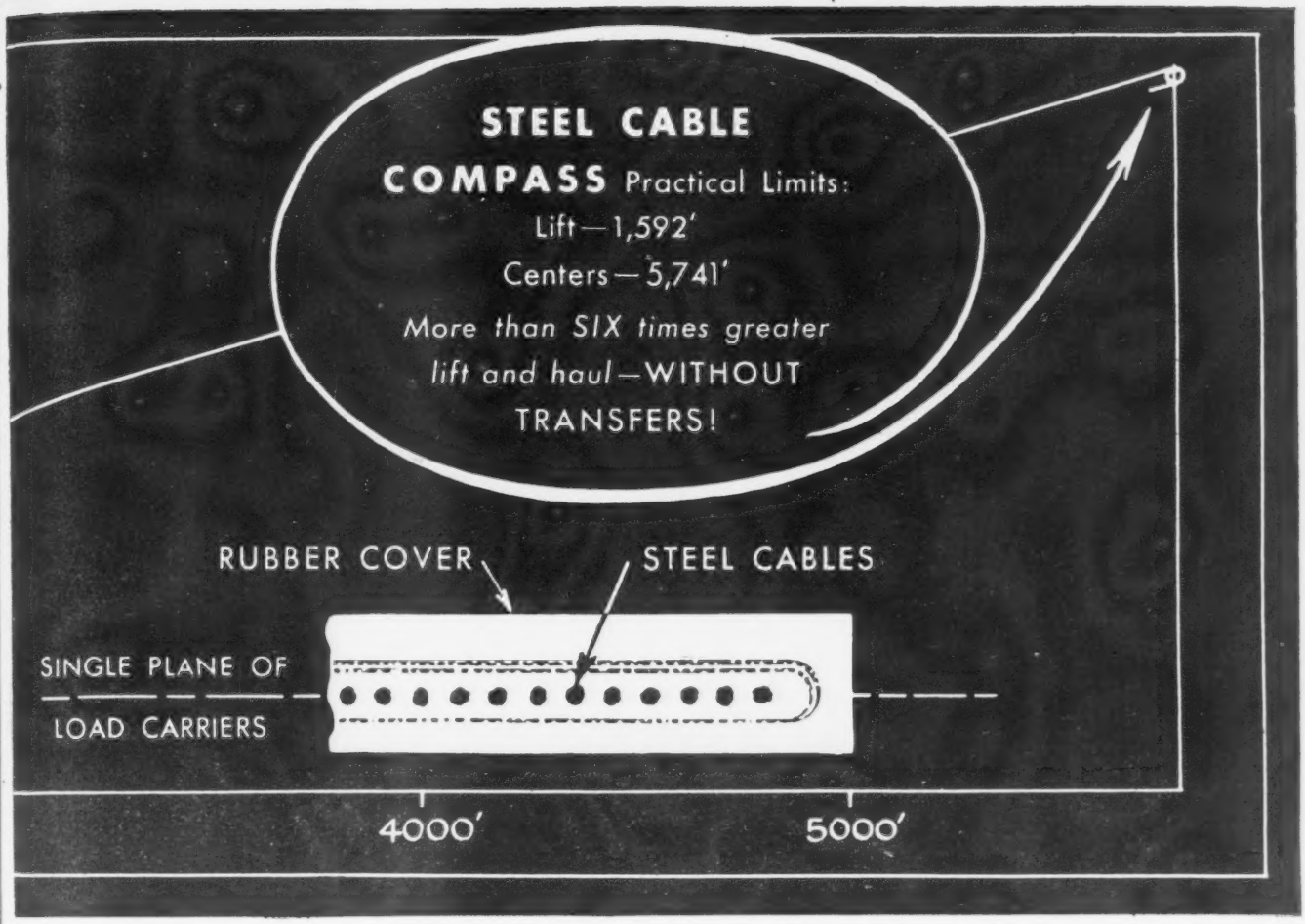
THE well-known economies of slope conveyor belts as escape from underground and deep pit mines are now further multiplied by a revolutionary new Goodyear transportation development — the **Compass** *Steel Cable Conveyor Belt.*

As its name implies, this new Goodyear rubber-covered belt is bodied with finely stranded, airplane-type steel cables having enormously greater strength and tension capacity than any belt of cotton cord or fabric construction.

What this means, operation-wise, is shown by the blueprint above. The new Goodyear Steel Cable **Compass** makes it possible to handle lifts as great as 1,592 feet with a single belt operating on mile centers — *more than SIX times greater lift and haul than practical with any present belt!*

NO TRANSFERS

As a result, the great majority of slope entries can now be belted with ONE Goodyear Steel Cable



Compass running from mine level to tipple — instead of the two, three or more belts required in current practice. Thus all belt transfers along the slope are eliminated, making it possible to carry much larger lumps, without breakage or degradation.

Further, **Compass'** high strength permits operation at slow enough speeds F.P.M. for optimum cross-section loading, assuring good nesting for large lumps — no tumbling or roll back. Slower speed also gives uniform, continuous, high-tonnage delivery at tipple — reduces idler wear and maintenance — insures longer belt life.

To get the full story of this "super" belt and its many other economies, consult the G.T.M. — Goodyear Technical Man — before rebelting present mines, or opening new workings. Write: Goodyear, Akron 16, Ohio or Los Angeles 54, California.

• • •

FOR HOSE, BELTING, MOLDED GOODS, PACKING built to the world's highest quality standard, phone your nearest Goodyear Industrial Rubber Products Distributor.

Compass—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

THE GREATEST NAME IN RUBBER

Production Up...

TEXACO

REG. T.M.

TEXACO LUBRICANTS

..Maintenance Down

When you use the famous lubricant that...

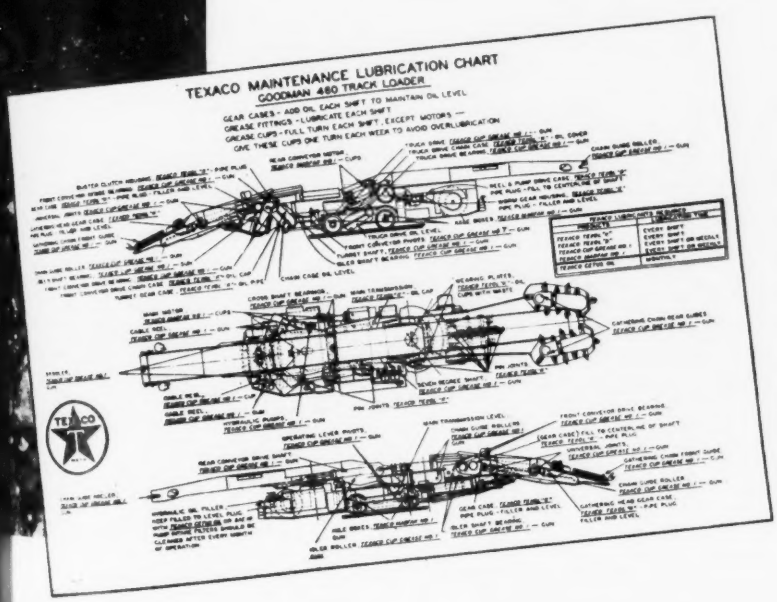
- ★ Resists squeeze-out, protects parts longer
- ★ Seals out dirt and moisture
- ★ Stays in bearings under all temperatures
- ★ Gives greater protection with fewer applications

USE *Texaco Marfak* to lubricate heavy-duty anti-friction and plain bearings. You will find, as have experienced operators everywhere, that fewer repairs and replacements are necessary, equipment stays in service longer, tonnage is greatly increased.

Marfak is one of the most widely used of all Texaco products. It has an unusually tough consistency that makes it *stay where you put it* despite heavy shocks and extremes of temperature. In addition, *Marfak* has the extraordinary characteristic of forming a fluid film inside a bearing while retaining its original consistency at the outer edges — thus sealing itself in, sealing the bearing against dirt and moisture.

For high-speed ball and roller bearings use *Texaco Regal Starfak.*

Texaco Lubrication Engineering Service is available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write The Texas Company, *National Sales Division,* Dept. C, 135 East 42nd Street, New York 17, N. Y.



FREE: Texaco Maintenance Lubrication Charts are prepared in cooperation with leading manufacturers of underground mining machinery who approve specific Texaco products for use on cutters, loaders, locomotives, etc. Charts show clearly where to use Texaco, when and with what lubricant to service each lubrication point. Order the Charts you need by make and model of each machine.

NTS For the Coal Mining Industry

Rubs

4 ARRANGEMENTS OF G-E SINGLE-CIRCUIT UNIT SUBSTATIONS

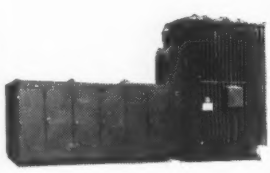
Arranged for overhead incoming and outgoing circuits. Simple, permits high portability.

Incoming circuit is overhead, and an underground cable is used for outgoing circuit.

Both incoming and outgoing circuits are underground. Offer full protection from weather.

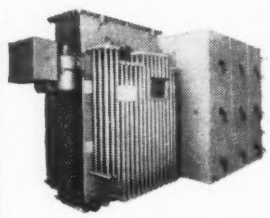
Arranged for both incoming and outgoing circuits to be underground, with a disconnect switch to isolate the unit from the incoming circuit.

There's a G-E Unit Substation for Every Mine and Preparation-plant Requirement



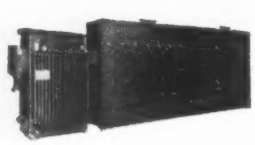
OUTDOOR MASTER UNIT

A complete master unit substation for multifeeder power systems, used instead of the single-circuit unit for operation where more than one feeder or loads above 2600 kva are encountered. Available in sizes from 750 kva to 25,000 kva for primary voltages up to 132,000 volts, and secondary voltages of 2400 to 15,000 volts.



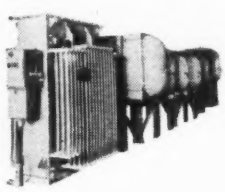
LOAD-CENTER UNIT

A compact substation for use close to 208Y/120- and 480-volt load-center areas supplied from 2400- to 15,000-volt sources. Adaptable to every low-voltage power requirement in preparation and extraction plants. Available in capacities from 100 to 2000 kva, indoor or outdoor.



CONTROL-CENTER UNIT

When it is necessary to supply and control 220- to 440-volt motor branch circuits in a mine conveyor system, for example, this substation can be used safely and effectively. Adaptable to power sources from 2400 to 15,000 volts.



FOR SEMI-HAZARDOUS LOCATIONS

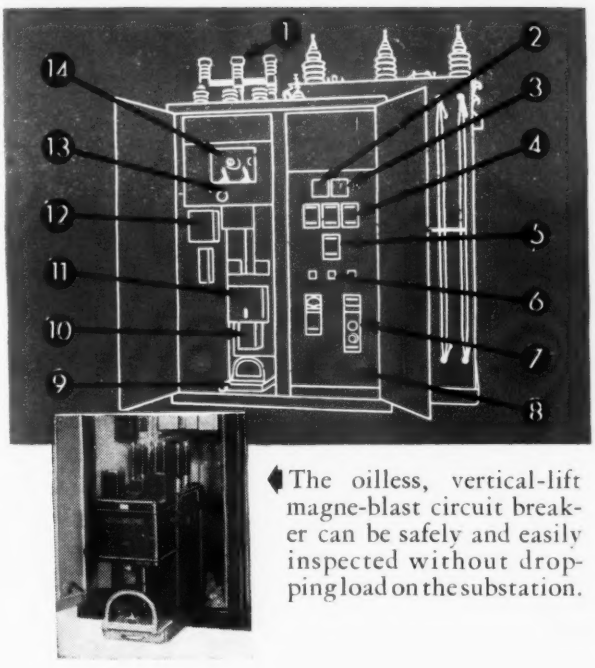
These unit substations feature completely metal-enclosed equipment with explosion-proof enclosures for low-voltage feeder breakers. (Class I, Group D, construction.) Can be used where semihazardous working conditions exist.

Keep on buying BONDS—*and keep all you buy*

GENERAL ELECTRIC

657-48-204

out risk...



The oilless, vertical-lift magne-blast circuit breaker can be safely and easily inspected without dropping load on the substation.

Principal Components of a G-E SINGLE-CIRCUIT, INTEGRAL-TYPE UNIT SUBSTATION

1. Lightning arresters
2. Ammeter
3. Voltmeter
4. Drawout-type, induction overload relays
5. Drawout-type ground relay
6. Breaker control switch
7. Drawout-type reclosing relay
8. Hinged control panel
9. Drawout inspection tray
10. Breaker operating mechanism
11. 5-kv, 50,000-kva, vertical-lift, magne-blast circuit breaker
12. Rectifier for breaker closing
13. Interlocked socket for by-pass switch handle
14. By-pass disconnect switch

This new G-E unit substation protects your operators against fatal shocks from strip-mining machines, yet doesn't "kick out" needlessly.

Here's a new integral-type unit substation that's a "natural" for strip mining. It is compact. It is readily portable. Best of all, it can be furnished with highly sensitive relays that detect those dangerous electrical faults which ordinary breakers miss (when stripping shovels and other mining machines are poorly grounded.)

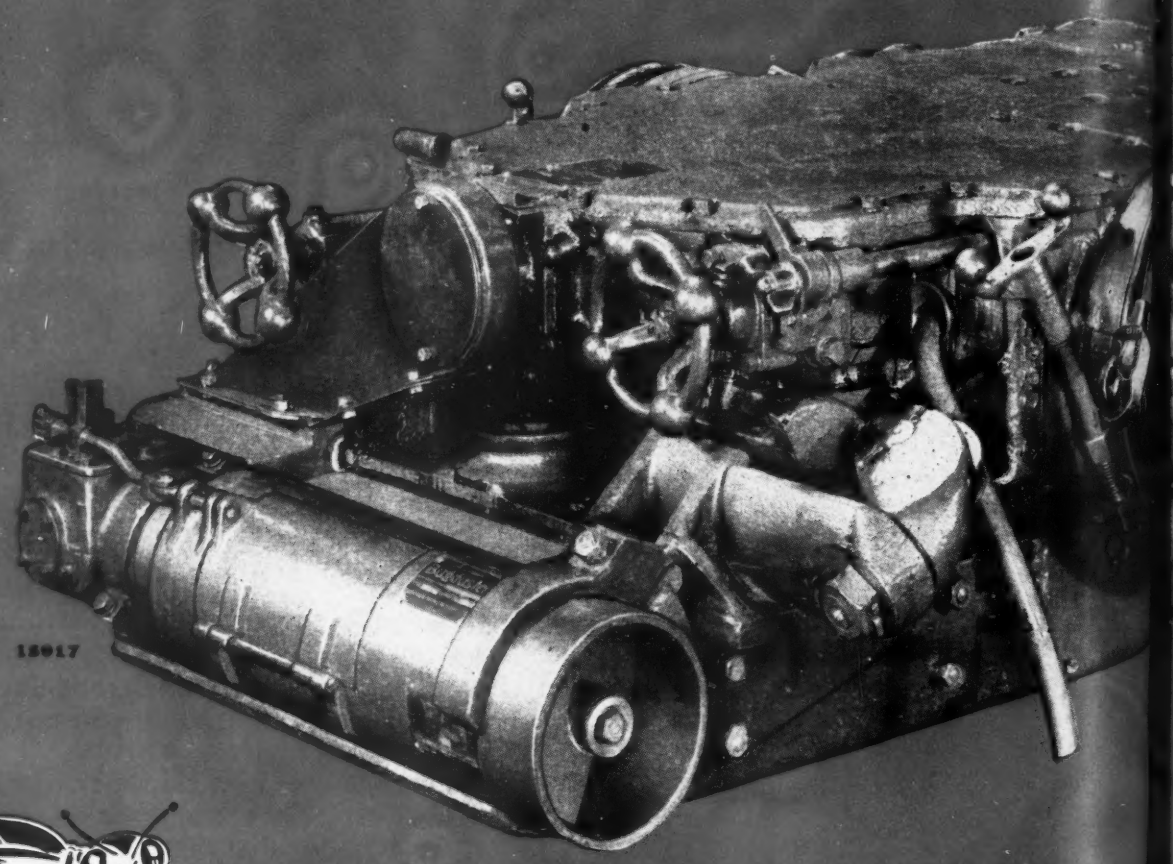
These relays and the grounding system used in this unit substation represent the best protection G-E design engineers know how to give against electrical shock hazards. They are also your best assurance of operating continuity. For this substation is not an "alarmist." Breakers will not kick out because of harmless overloads or faults.

HIGHLY PORTABLE The substation is mounted on a single base. Moving it, as stripping operations advance, is a simple matter. You avoid excessive voltage drops and keep your machines running at full capacity.

For a complete description, write for Bulletin GEA-4300. Whether for strip mining, underground mining, or preparation plants, G.E. has the substation you need. With an eye to lower operating costs in the coming competitive era, it will pay you to review your present power distribution system with a G-E sales engineer. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

SLACK DISPOSAL

for GOODMAN 512



The Bugduster is a screw type conveyor powered from the main motor by a chain drive through an overload clutch. It can be stopped or started while the main motor is running. As a safety measure the inspection cover cannot be opened without first disengaging the clutch.

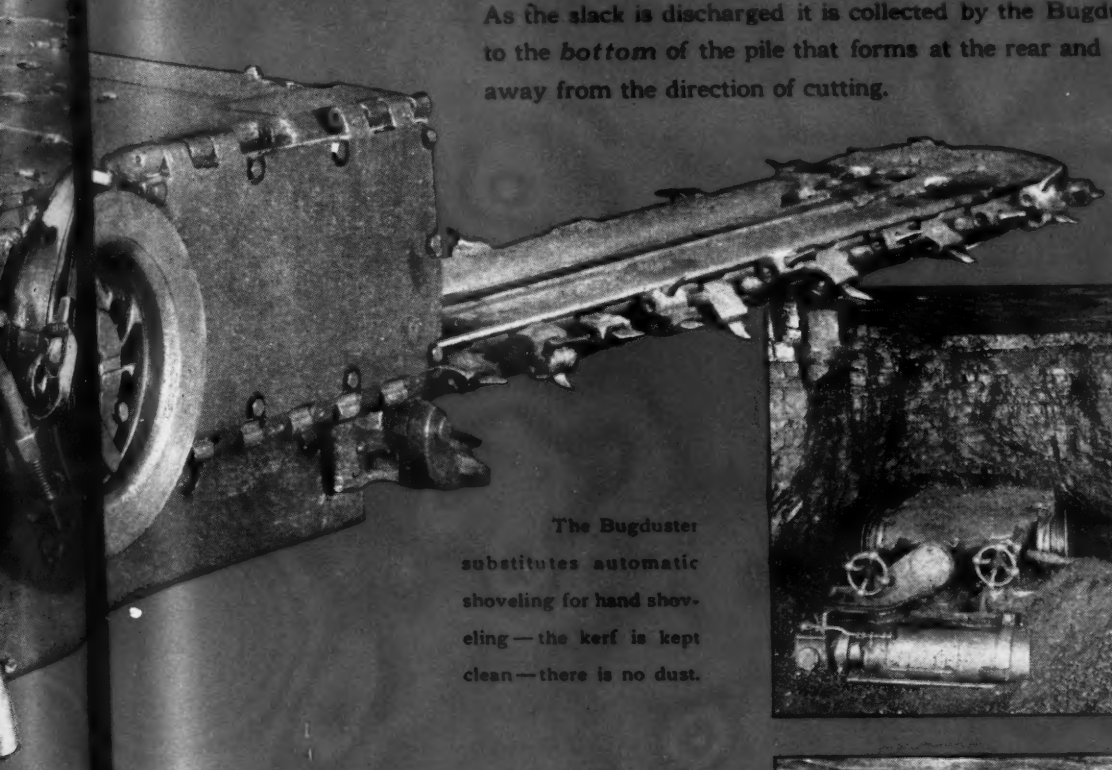
GOODMAN MANUFACTURING COMPANY

WILKES-BARRE • PITTSBURGH • HUNTINGTON • TERRE HAUTE

L NO PROBLEM

2 SHORTWALL with Bugduster

As the slack is discharged it is collected by the Bugduster and forced into the *bottom* of the pile that forms at the rear and side of the machine away from the direction of cutting.



The Bugduster substitutes automatic shoveling for hand shoveling — the kerf is kept clean — there is no dust.

16144

The slack deposited by the Bugduster can be readily loaded out by a Duckbill-Shaker Conveyor.

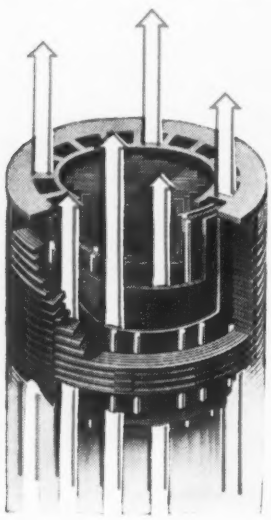
16145

ANY HALSTED AT 48TH • CHICAGO 9, ILLINOIS

IAUTE BIRMINGHAM • DENVER • SALT LAKE CITY

underground

150 OR 3750 KVA



Air performs a double duty in the ASL—(1) it insulates (2) it carries heat away—with only *one* heat transfer. Chimney-like construction assures a strong natural draft which cleans as it cools.

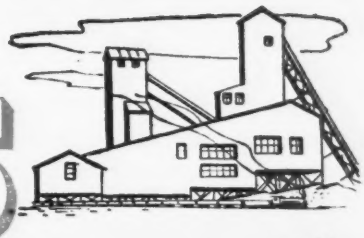
- **Minimum fire or explosion hazard.**
- **No catch basins required.** Install indoors overhead . . . or in remote or near remote underground places.
- **Weighs 25 to 50% less** than comparable liquid-filled units . . . easier to move to load centers . . . requires less space.
- **Low maintenance**—not susceptible to moisture or condensation. No gaskets—no fittings to inspect and maintain.
- **High short-time overload capacity** . . . glass and porcelain insulation used are not affected by operating temperatures.
- **Complete lightning protection** possible with valve-type arresters.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

OPERATING PARTNER IN THE

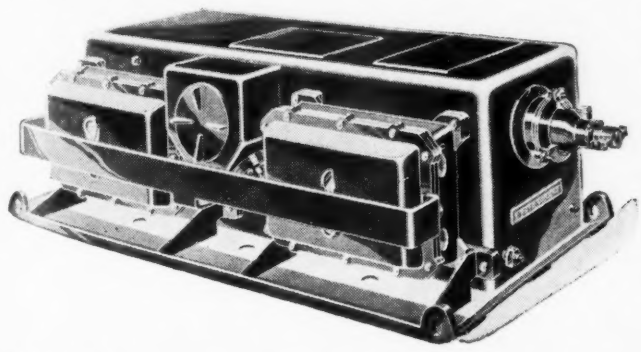
or indoors



6 REASONS WHY WESTINGHOUSE ASL DRY-TYPE TRANSFORMERS ARE RECOMMENDED

Typical mining installation. The three ASL transformers shown here are rated 150 kva each . . . installed underground in an ore mine.

Designer's conception of the future Power Center for underground service in mines.



MINING INDUSTRY

Both dry and liquid-filled transformers are made by Westinghouse—and the principle guiding their application is simply this: The right transformer on the right job. Westinghouse makes the Inerteen-filled transformer, which in many applications is unsurpassed by either oil or air-cooled transformers.

But for mining applications—either below or above ground — Westinghouse strongly recommends air-cooled, dry-type transformers. Type ASL transformers have rolled up a performance record which makes their application in mine service a first consideration.

Since the first Westinghouse ASL transformer was built nearly 10 years ago (rated at 500 kva, 13,200 volts) the demand for this product has been steadily growing. Now more than 2,000 Westinghouse ASL transformers, with a total capacity of over 1,000,000 kva, have established a performance record unsurpassed by any other type of transformer.

Over a period of five years, hundreds of ASL transformers have been placed underground in all types of mining service . . . and to date, we have not heard of a single failure. Moisture, dust or rough handling have not affected their continuous operation.

With such a performance record, in mines of all types, ASL transformers are a "natural" where dependability is a must.

Whether you are planning a transformer installation near the mine face, or above ground, Westinghouse will be glad to render engineering assistance to help you put the right transformer on the job. Westinghouse will help you apply the dry-type and liquid-filled transformers in their correct applications. For complete information, call your Westinghouse office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94696

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But here's the Tire built to take it!

U. S. ROYAL CON-TRAK-TOR

FROM OPEN, ROCKY PITS to mill or rail point . . . U. S. Royal Con-trak-tors are engineered to take the savage wear and tear of the toughest roads and severest loads. See your U. S. Tire Dealer now!

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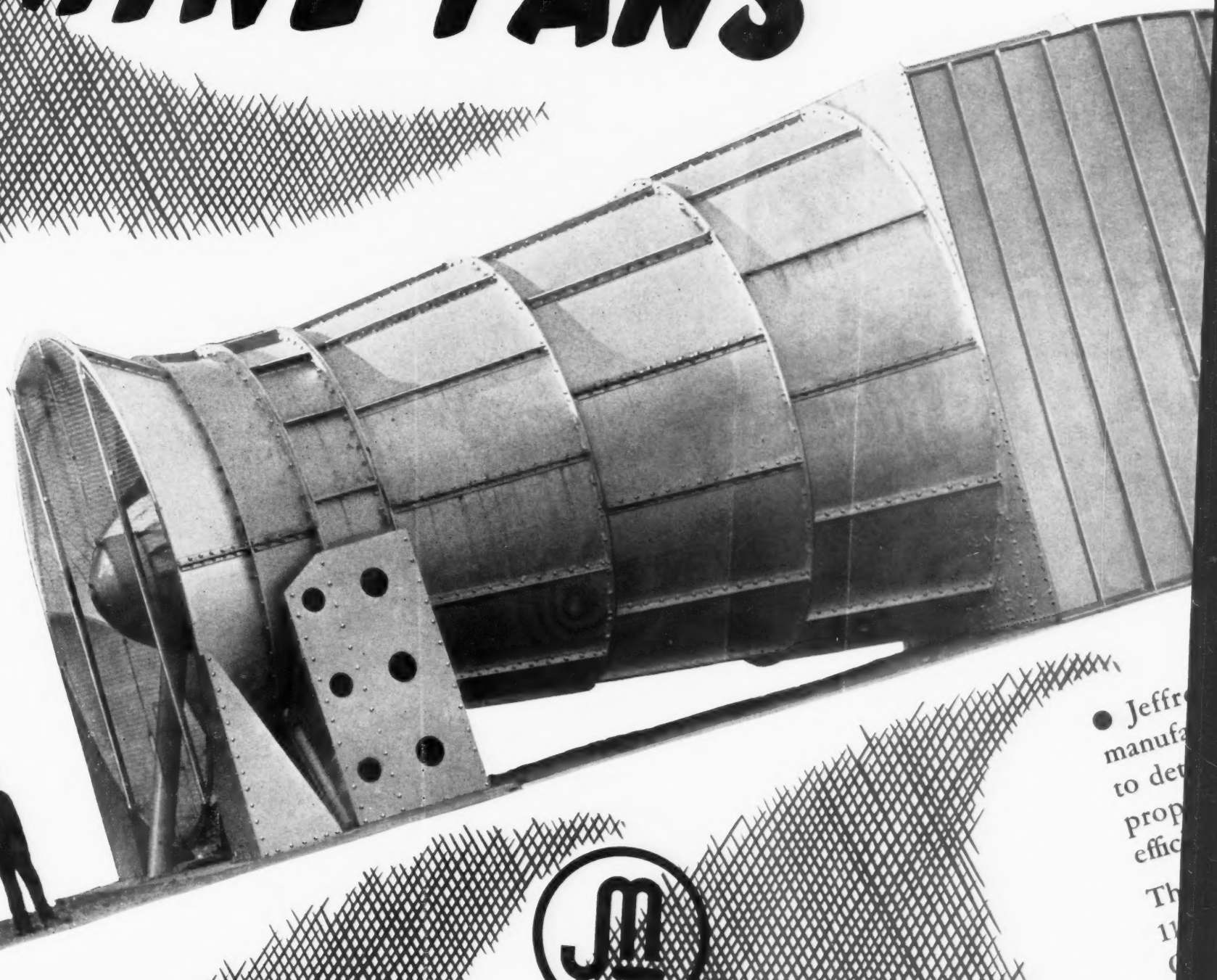
JEFFREY AERO MINE FANS



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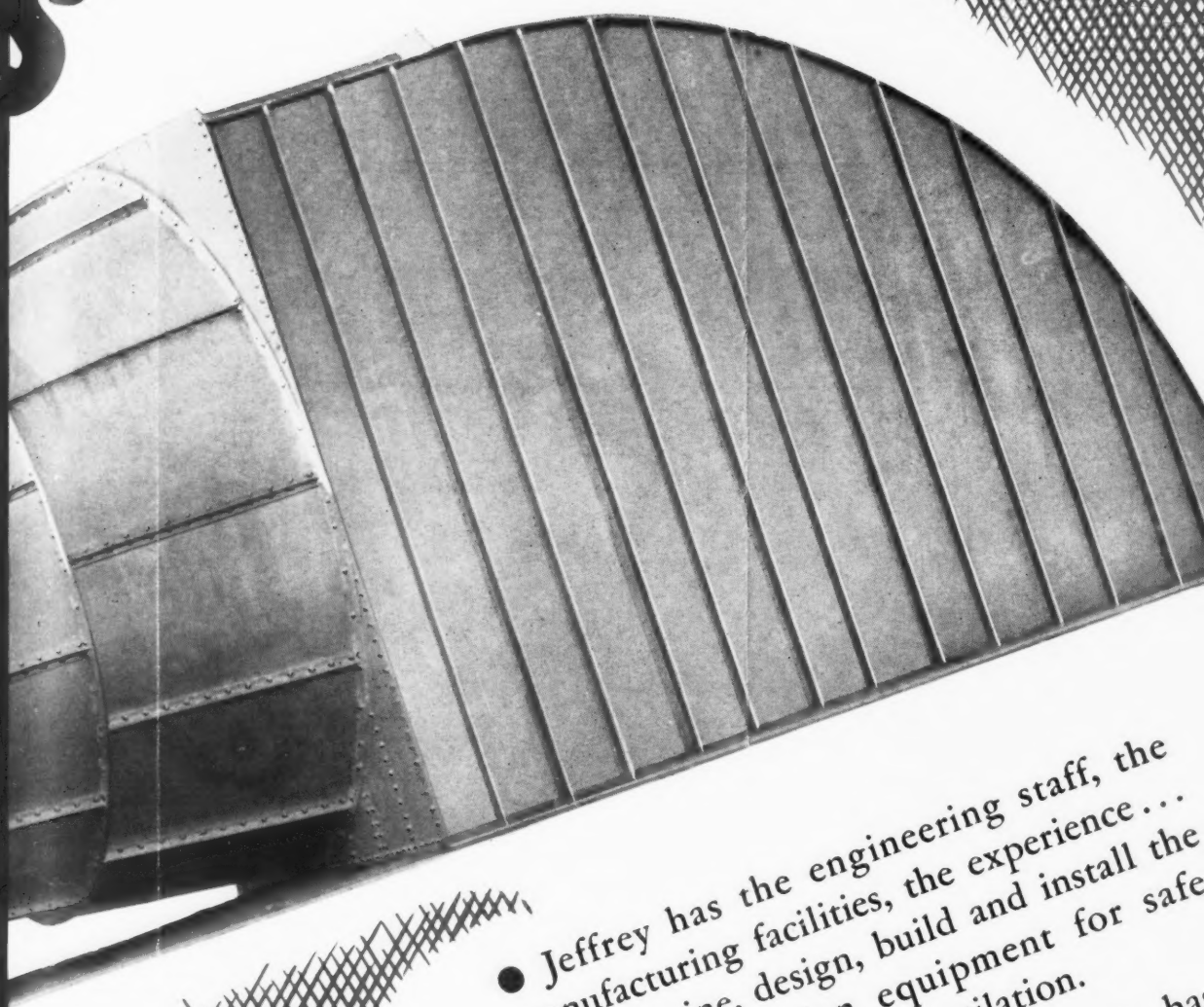
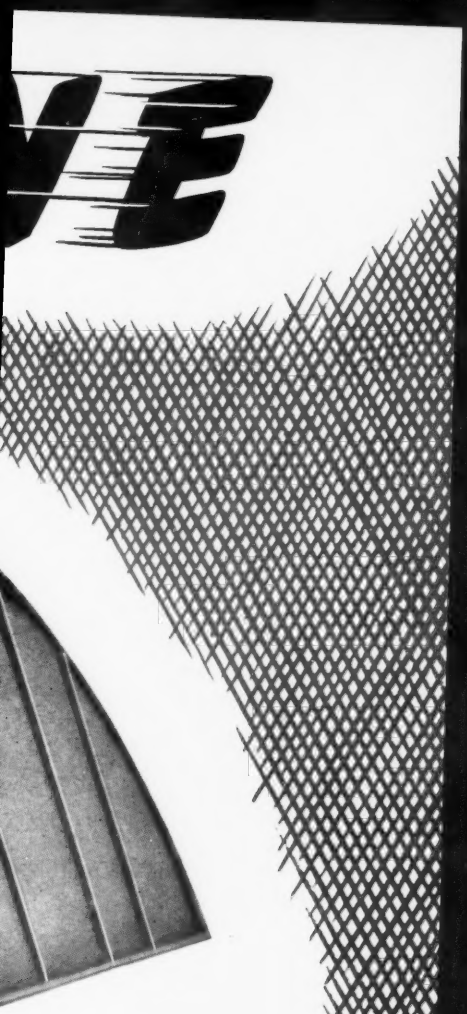


● Jeffrey has the engineering staff, the manufacturing facilities, the experience... to determine, design, build and install the proper ventilation equipment for safe efficient underground ventilation.

The Jeffrey 8-H Aerodyne shown ha 117-inch rotor with adjustable pitch bla Capacity—550,000 cubic feet at 9" V —840 R. P. M. at 1000 B. H. P.

Full descriptive bulletins availab



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itch blades.
at 9" W. G.
P.

available.

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● That sulfa drugs are worth 800 times as much as the coal from which the basic chemicals are derived.

...NOW?

That Jeffrey Aerodyne Fans pass over a billion tons of mine air annually.

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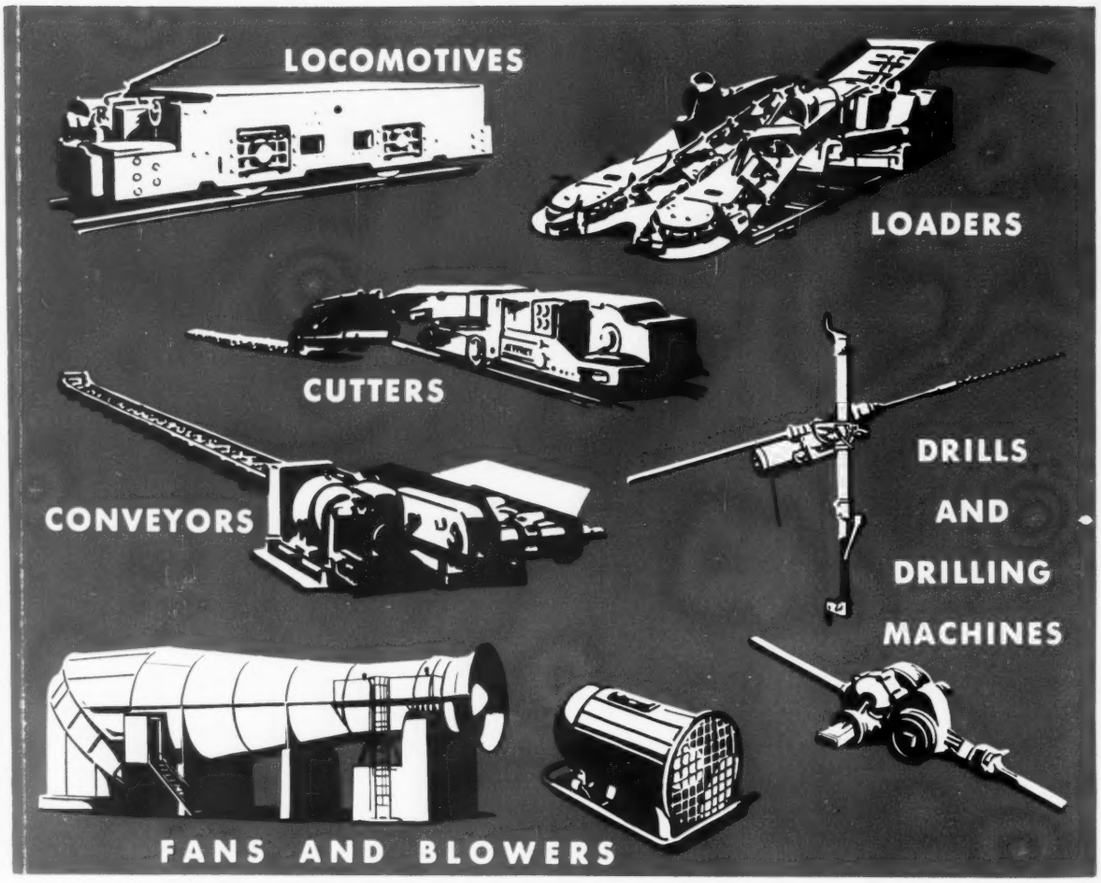
Service

Foreign

Jeffrey
EQUIPMENT FOR COAL MINES

JEFFREY SERVICE TO THE COAL MINES
MEANS SERVICE TO ALL INDUSTRY



THE JEFFREY MANUFACTURING COMPANY

Established in 1877

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Sales Offices: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Denver, Harlan, Houston, Huntington, Milwaukee, New York, Philadelphia, Pittsburgh, Scranton, St. Louis, Salt Lake City

Service Stations: Pittsburgh, Harlan, Ky., Birmingham, St. Louis, Logan-Beckley, W. Va., Scranton

Foreign Plants: Jeffrey Mfg. Co., Ltd., Montreal, Quebec; British Jeffrey-Diamond, Ltd., Wakefield, England; Jeffrey-Galion (Pty.), Ltd., Johannesburg, S. A.

For All This and More...
We Can Thank *Coal*

PROBABLY nothing on earth contributes so much to human comfort and well-being as COAL.

A COAL fire, glowing and crackling on the hearth.

The satisfying, even heating of a home equipped with a modern, stoker-fired, COAL-burning furnace.

Electric appliances . . . powered by COAL.

Music . . . recorded on plastic made from COAL.

Drugs, perfumes, dyes, flavors, vitamins . . . chemical children of COAL.

In a thousand ways, COAL serves sight, hearing, touch, taste, smell. And millions of dollars are being spent to learn how COAL can be used still more fully and economically, and for greater good.

Chesapeake and Ohio is proud to be associated with coal, as evidenced by its recent advertising in 466 newspapers and leading national magazines proclaiming the accomplishments of the coal industry.

Chesapeake and Ohio practices what it preaches. It is an active participant in all major coal-research programs. It believes in the future of coal and in the efficiency and economy of coal for hauling both freight and passenger trains. When you ship via Chesapeake and Ohio, you know your coal is being hauled exclusively by coal-burning locomotives.

THE CHESAPEAKE AND OHIO RAILWAY

"The 100% Coal Railroad"

GREASES..ENGINEERED TO

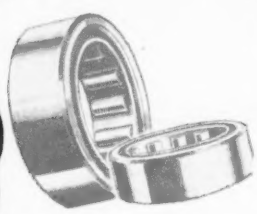
9 YEARS . . . WITHOUT A BEARING FAILURE

That is the report of a mine operator running a 730 foot conveyor belt from cleaning house to boom house . . . most of it outdoors in all weather. Yet, for nine years, two shifts a day, the conveyor's anti-friction bearings have never failed. The operator attributes this trouble-free performance to Tycol Green Cast Greases that "take-it" and provide the "film of protection" under heat and cold alike.

NO STARVED BEARINGS ON OUR 400 MINE CARS

Low winter temperature drag was eliminated and no starved bearings during high summer operating temperatures—resulting in less power consumption and reduced maintenance costs. Now thanks to Tycol Green Cast Greases there is no worry over changes in atmospheric temperatures—in or out of the mine. Thus drag, loss of power and excessive use of lubricant has been eliminated.

COSTLY WEAR OF ROLLER BEARINGS STOPPED



"Tycol Green Cast Grease never leaves a soap or foreign deposit in the bearings," stated one operator. Gone is the worry over delays and costs caused by separation and breakdown of grease formerly used. Tycol grease resists breakdown in structure, thus assuring maximum lubrication.

INDUSTRIAL TYCOL OILS-GREASES

TYCOL INDUSTRIAL

ENGINEERED FOR EVERY

"TAKE-IT"

ON THE

TOUGHEST JOBS!

Peak production . . . without worry of breakdown due to friction and wear . . . is made easier with Tycol Green Cast Greases.

Engineered to "take-it," without thinning down and dripping, Tycol Green Cast Greases avoid wasted lubricant, lost bearings and unnecessary "time out". These modern lubricants keep bearings . . . pistons . . . gears friction-free and cool. They supply the "film of protection" needed to give power a chance to produce with a minimum of waste.

Call your nearest Tide Water Associated office. Let them suggest the Tycol Green Cast Grease engineered to "take-it" on your specific problem . . . and remember, Tycol greases are made from high quality cylinder stock and well refined neutral oil, with a minimum of soap—a maximum of oil . . . more efficient lubrication per pound of grease.

PENETRATION

This informative handbook gives clear, concise descriptions of the basic tests used to determine important lubrication properties—Penetration, Viscosity, Pour Point

WHAT IT MEANS IN GREASE — SEE TIDE WATER "LUBRICANIA"

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MARION

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THE MARION STEAM SHOV

151M

ROCK SHOVEL!

Here it is...

WITH EVERY FEATURE NECESSARY
FOR
HEAVY DUTY SERVICE

OUTSIDE DIPPER HANDLE
TWO-PIECE DIPPER
SINGLE HITCH TO DIPPER
AMPLIDYNE - ROTOTROL CONTROL

POWER - SPEED - WEIGHT
COMBINED TO MAKE THIS THE
MACHINE OF TOMORROW

WHAT IS YOUR PROBLEM?

3/4 CU. YD. TO 40 CU. YDS.

OMPANY • MARION, OHIO

LIKE A CHAMPION SKATER

FORM-SET ROPE IS *relaxed*

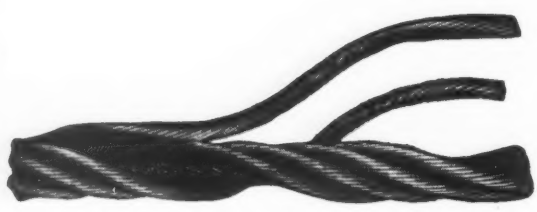
Ever watch a truly great skater? Ever watch him rocket down the straightaways, glide around the turns? He's graceful, swift, sure . . . a study in balance and smooth endurance . . . because he's *relaxed.*

You'll find much of that same relaxed quality in Bethlehem Form-Set rope. Form-Set rope is preformed: each wire and each strand is molded to its final helical shape before being laid in the rope. In this way many internal stresses and strains are relieved. Since the wires and strands are preshaped into their final form, they have no nervous urge to straighten themselves out. They do not fight to uncoil. The rope is *relaxed.*

Cut a section of Form-Set rope. You'll notice that not a single wire or strand pops loose from the rope. They all lie smoothly in place. To get them apart, you actually have to lift them out with your fingers.

What is the advantage of this *relaxation*? Clearly, it means easier handling. But more important still, it promotes *longer life* on jobs where bending fatigue is a serious item—and this includes practically all operating ropes.

Bethlehem furnishes every grade, size, and type with the Form-Set construction . . . the feature that *relaxes* wire rope.



Why a Form-Set (preformed) rope is relaxed. Preforming "sets" the wires and strands in their helical permanent shape, so that they have no tendency to fly apart, even when cut or broken.

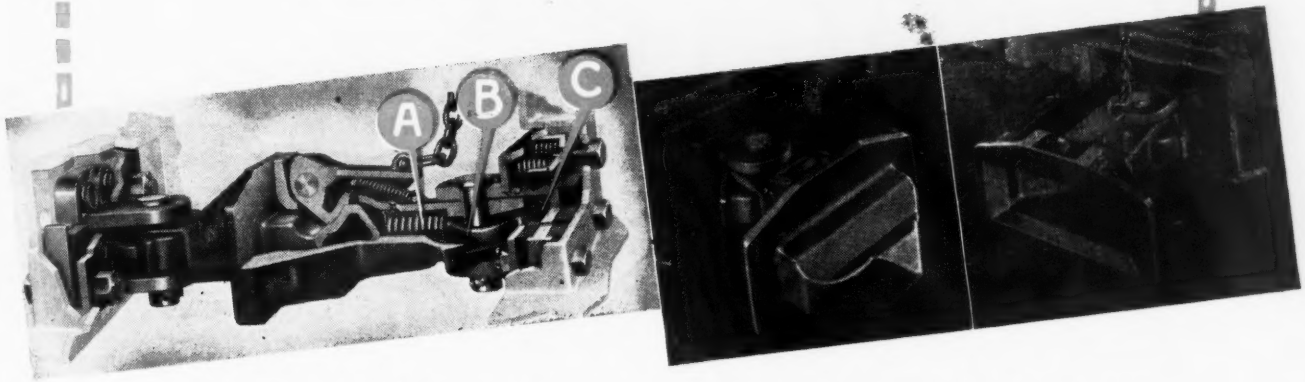
When you think WIRE ROPE . . . think BETHLEHEM

Get the Advantages of

--AUTOMATIC SELF-CENTERING EXTRA-WIDE GATHERING RANGE--

with O-B AUTOMATIC MINE CAR COUPLERS

Both are necessary to provide efficient, trouble-free mine haulage



Automatic Self-Centering

Eliminates need to go between cars to align couplers before cars bump together. Heavy spring (A) forces rear legs of floating ring (B) against seat (C) holding heads in longitudinal center with respect to car.

Extra-wide Gathering Range

Permits heads to couple automatically on all normal curves as well as straight track. The point on male head need only enter bellmouth of female head anywhere within its full fifteen inch length. The O-B Automatic Coupler does the rest.

For Your Next Mine Car Installation, Specify

O-B AUTOMATIC COUPLERS

Designed Specifically to Meet Mine Operating Conditions

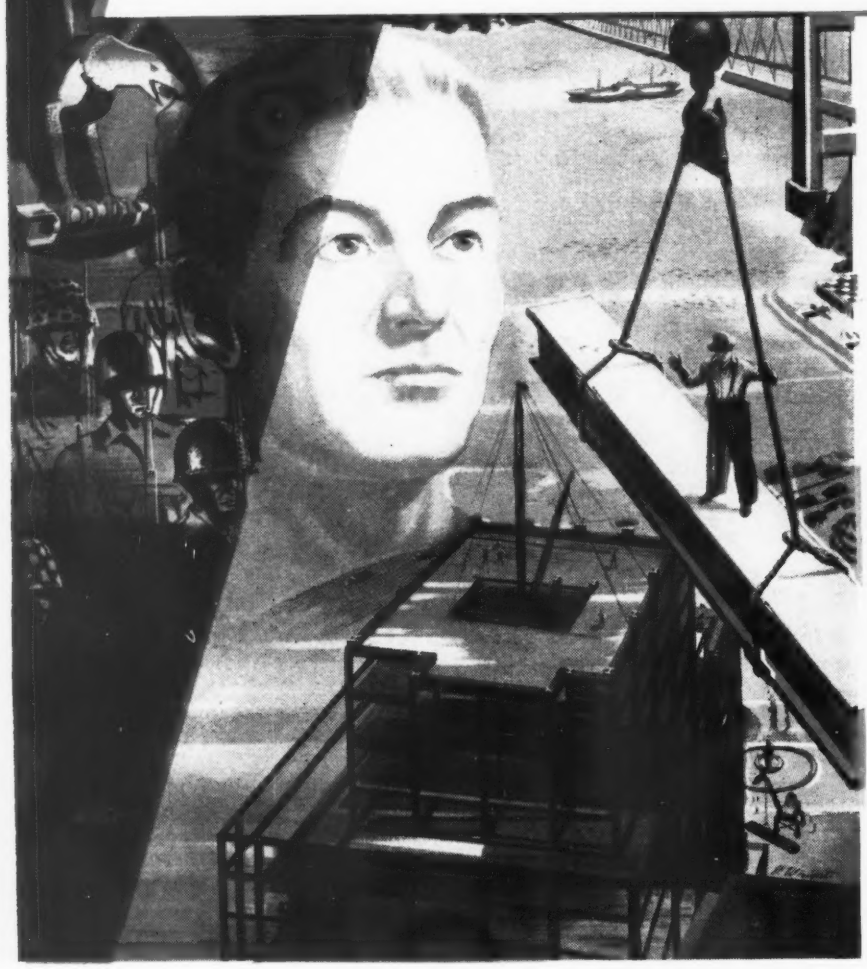
Ohio Brass

MANSFIELD, OHIO

CANADIAN OHIO BRASS CO. LTD., NIAGARA FALLS, ONT.

194X IS HERE

FOR 100,000 BUYERS OF ELECTRICAL EQUIPMENT



194X no longer denotes the future. For manufacturers and miners, for contractors and builders, for all industry, this means that materials that have long been scarce or restricted are now available. Roebling Electrical Wires and Cables, for instance, are again ready to carry the power that runs your machines, lights your homes and turns the wheels of commerce.

Roebling electrical wire products range from bare copper wire conductors to high voltage rubber insulated power cables—from finest magnet wire to heavy armored borehole, rubber insulated power and mining machine cables. These products have been improved by constant research and new war-inspired manufacturing techniques. Each foot of wire, each reel of cable is backed by experienced engineering, produced by modern manufacturing facilities, and distinguished by a name that has meant quality in wire products for over a century.

When you order Roebling electrical wires and cables you are also assured of the utmost in service – trained field representatives ready to furnish immediate assistance on technical problems and a comprehensive warehousing network that means you get the quantities you want *when* you want them.

Now that 194X is here, call on Roebling to fill your electrical wire and cable requirements.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
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ROEBLING WIRE AND CABLES • WIRE ROPE AND STRAND • FITTINGS • SLINGS • WIRE CLOTH AND NETTING • SUSPENSION BRIDGES AND CABLES COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • AERIAL WIRE ROPE SYSTEMS • AIRCORD, SWAGED TERMINALS AND ASSEMBLIES ELECTRICAL WIRES AND CABLES

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PACEMAKER IN WIRE PRODUCTS

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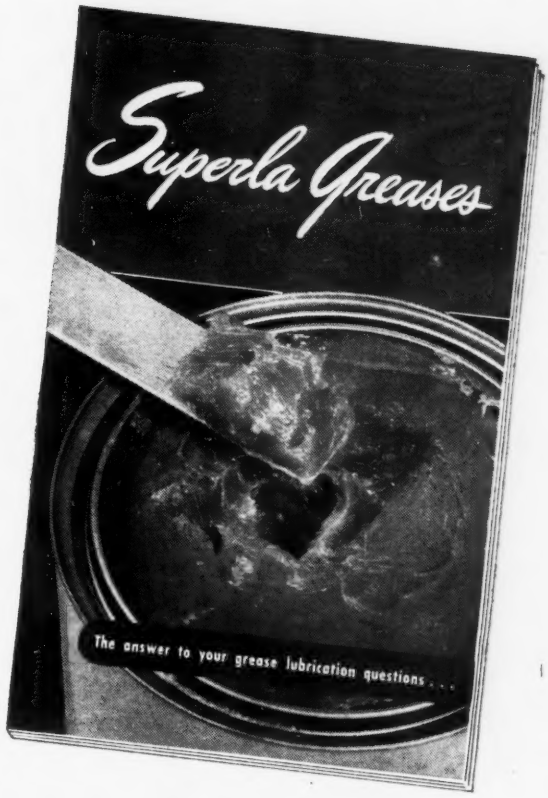
One complete line of greases . . . Superla greases



Can replace many special, premium priced greases on a wide range of applications.

SUPERLA GREASES in your plant will simplify your lubricating problem. This line of greases, in two types—Superla Numbered Greases and Superla "X" Greases—will handle most anti-friction bearing lubrication jobs—from low to high speeds and low to high temperatures.

In many instances, Superla Greases have replaced special greases and thus have simplified the job of ordering, stocking, and applying lubricants. This advantage of wide application is the result of combining many grease qualities in one line of high-grade lubricants. You can find out what these qualities are and what they mean in better lubrication by getting the booklet illustrated. In applying these greases to your particular job you can get valuable help from a Standard Oil Lubrication Engineer. You can reach him through the nearest Standard Oil Company office.

Send for a copy of this booklet

It describes the characteristics of the various grades in the Superla Grease line and suggests applications. Simply write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for your copy.

Buy and hold more Victory Bonds

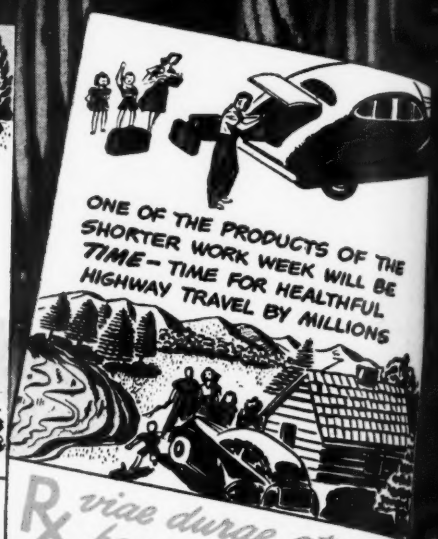
SUPERLA GREASES

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

THE DOCTOR HAS PRESCRIBED . . .

Rx viae durae atque bonae sine fine ✻

EVERYTHING WE EAT AT SOME TIME OR OTHER MUST TRAVEL A ROAD OR HIGHWAY

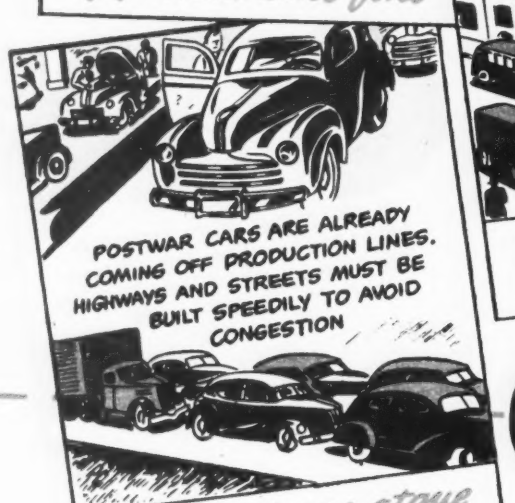


ONE OF THE PRODUCTS OF THE SHORTER WORK WEEK WILL BE *TIME*— TIME FOR HEALTHFUL HIGHWAY TRAVEL BY MILLIONS

DOCTORS ARE UNABLE TO REACH THOUSANDS OF FAMILIES QUICKLY

43% OF THE COMMUNITIES IN THE UNITED STATES RELY EXCLUSIVELY ON MOTOR CARRIERS.

THE SOCIAL AND RELIGIOUS LIFE OF THOUSANDS AND THOUSANDS OF FAMILIES IS STIFLED BY SECONDARY ROADS THAT ARE IMPASSABLE MUCH OF THE TIME.



POSTWAR CARS ARE ALREADY COMING OFF PRODUCTION LINES. HIGHWAYS AND STREETS MUST BE BUILT SPEEDILY TO AVOID CONGESTION

Rx viae durae atque bonae sine fine

Rx viae durae atque bonae sine fine

Rx viae durae atque bonae sine fine

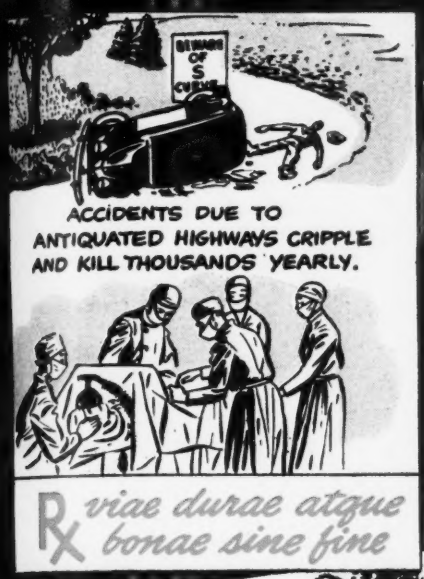
Rx viae durae atque bonae sine fine

Rx viae durae atque bonae sine fine

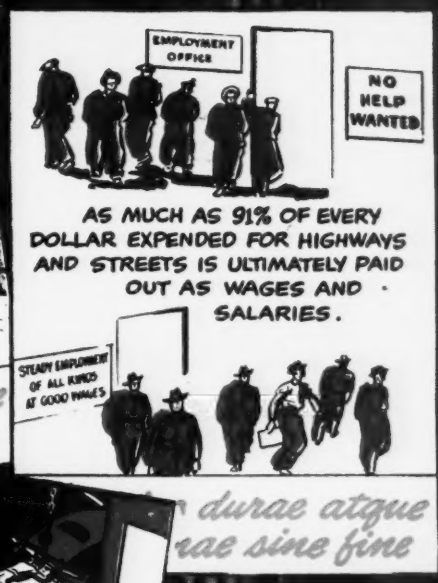
UNION WIRE ROPE CORP.

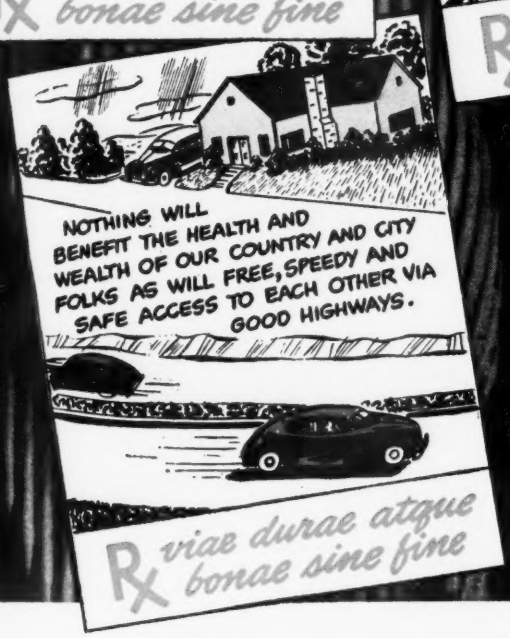
union *Wire Rope*

union-formed is *Preformed* TO OUTPERFORM

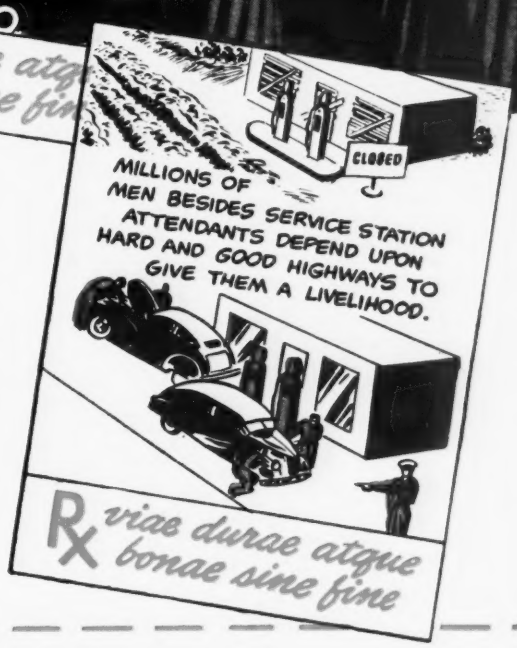


LOW, NARROW AND LIGHT BRIDGES CONSTITUTE UNSAFE, OFTEN UNUSABLE LINKS IN OTHERWISE ADEQUATE ROADS.
Rx viae durae atque bonae sine fine


EMPLOYMENT OFFICE
NO HELP WANTED
AS MUCH AS 91% OF EVERY DOLLAR EXPENDED FOR HIGHWAYS AND STREETS IS ULTIMATELY PAID OUT AS WAGES AND SALARIES.
STEADY EMPLOYMENT OF ALL KINDS AT GOOD WAGES
durae atque
rae sine fine


NOTHING WILL BENEFIT THE HEALTH AND WEALTH OF OUR COUNTRY AND CITY FOLKS AS WILL FREE, SPEEDY AND SAFE ACCESS TO EACH OTHER VIA GOOD HIGHWAYS.
Rx viae durae atque bonae sine fine

AUTO REPAIRS
FEW CARS AND TRUCKS SERVE THE FULL LIVES OF WHICH THEY WILL BE CAPABLE WHEN ALL ROADS ARE HARD AND GOOD.
Rx viae durae atque bonae sine fin


CLOSED
MILLIONS OF MEN BESIDES SERVICE STATION ATTENDANTS DEPEND UPON HARD AND GOOD HIGHWAYS TO GIVE THEM A LIVELIHOOD.
Rx viae durae atque bonae sine fine

THE DOCTOR HAS PRESCRIBED...

✻HARD AND GOOD ROADS WITHOUT END

Not only has the doctor written this prescription—he has earmarked funds to pay half the cost of a 3 year course of medicine.

The other half (1½ billion dollars) must be raised by 48 patients. The will to get well of a majority of them is at a low ebb. Only 7 states have sufficient plans for the first year of the program. Plans for highway projects ready to let amount to less than half the medicine apportioned by the doctor for the first year to say nothing of the other 2½ years.

A lot of nursing is yet necessary. If a large highway construction program is to be gotten under way in 1946, then everyone in the industry and profession must turn nurse and help the doctor coax the patients to take their medicine. Otherwise, men will go unemployed, traffic will snarl and the next dose of medicine will be plenty bitter for lovers of the American way of life to take.

UNION WIRE ROPE CORPORATION, 2130 Manchester Ave., Kansas City 3, Mo.

☐ Send a Free copy of book entitled "The Road Ahead"
☐ Send a Free copy of book entitled "Put Your Town on the Air Map"

Name.....

Firm.....

Address..... *City*..... *Zone*... *State*.....

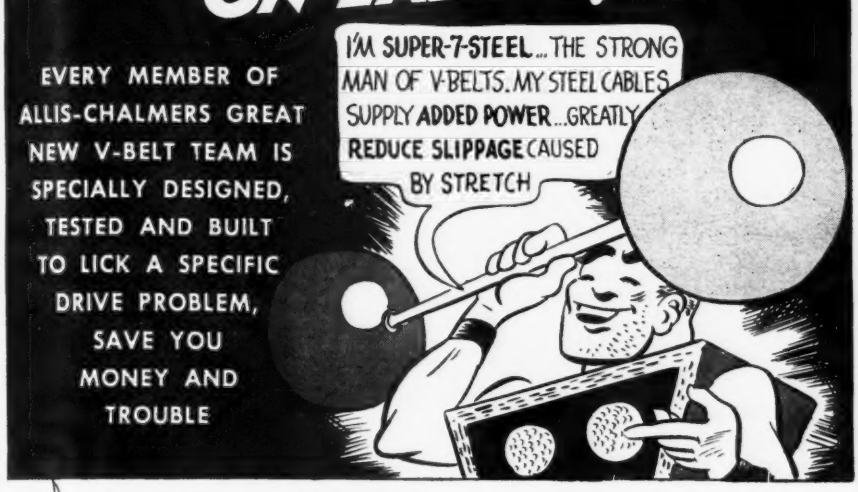
E-46

Through the war years, the cost of the job was secondary to *getting that job done.* But from now on, COST—both operating and maintenance—will be the all-important factor in the purchase of new heavy-duty mining equipment. When it comes to deciding what kind of power will operate that equipment at lowest cost, don't overlook the proved-on-the-job advantages of high-speed Cummins Dependable Diesels . . . their demonstrated reliability and long life . . . their easy, economical maintenance and service . . . their high horsepower output per pound of engine weight. Models for all types of heavy-duty mining applications . . . hauling, stripping, loading or stationary . . . 50 to 275 hp.

CUMMINS ENGINE COMPANY, INC.
Columbus, Indiana

Greatest V-Belt Show ON EARTH!

EVERY MEMBER OF ALLIS-CHALMERS GREAT NEW V-BELT TEAM IS SPECIALLY DESIGNED, TESTED AND BUILT TO LICK A SPECIFIC DRIVE PROBLEM, SAVE YOU MONEY AND TROUBLE



THIS ISN'T AN ACT. I CAN EAT UP 180°F TEMPERATURES ALL DAY LONG. IF THE HEAT'S ON YOUR DRIVES, CALL FOR HEAT-RESISTING SUPER-7
THEY CALL ME STATIC-RESISTING SUPER-7 BECAUSE I CARRY STATIC CHARGES TO MACHINES WHERE THEY'RE GROUNDED.
DON'T WORRY IF YOUR BELTS MUST PRACTICALLY BATHE IN OIL OR GREASE. JUST ASK FOR SUPER-7 OIL-PROOF. I'M MADE OF IMPERVIOUS NEOPRENE.
OIL
A LITTLE OIL DOESN'T FAZE ME AT ALL. I'M OIL-RESISTING SUPER-7 ... HANDLING 90% OF ALL OILY DRIVE CONDITIONS.

Texrope V-belts are available nation-wide through Allis-Chalmers Dealers and Sales Offices. It pays to make Allis-Chalmers your V-belt drive headquarters.

ALLIS-CHALMERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.

A 1961

BULLETIN!

SPEED RECONVERSION WITH HELP OF NEW FREE A-C KIT!

Guide to "How to Take Reconversion Inventory" of Drives, Motors, Pumps

Help in the big job of reconverting for peacetime production is now offered to plants everywhere by Allis-Chalmers Mfg. Co., its district offices and distributors. To all who request it, we're sending the new "Reconversion Inventory Kit", planned to speed the task of determining the condition of your existing equipment — V-belt drives, motors, and centrifugal pumps — which will be used in reconverted production.

SUGGESTS PROCEDURE, STATES STANDARDS

Used by foremen, maintenance men, and engineers, the Kit is a real time-saver . . . leads efficiently to probable trouble spots, helps clear them up. Gives bearing tolerances, resistance formulae, etc., in compact, easily-used form. Check List appraisal charts help determine present and future condition of units inventoried.

HOW TO GET YOUR KIT

For your free Reconversion Inventory Kit, call your nearest Allis-Chalmers distributor or district office, or write Dept. 100, ALLIS-CHALMERS MFG. CO. Milwaukee 1, Wis.

ALLIS-CHALMERS MFG. CO.
Dept. 100, Milwaukee 1, Wis.

Please send Reconversion Inventory Kit free of charge to:

Company.....

Address.....

.....

Attn. of Mr.....

HEAR THE BOSTON SYMPHONY: *Saturday, American Broadcasting Co.*

COMPLETELY NEW! . . .

Two-Purpose Tool for Coal and Rock Drilling

Thor

LIGHTWEIGHT, PNEUMATIC

NO. 33 SINKER ROCK DRILL

Three years ago Thor engineers started the development of a new Thor sinker rock drill for the anthracite mines.

A few months ago that finished Thor drill, especially developed for the anthracite field, came up from the mines with so many test-proven "*firsts*" in new operating advantages that it brought with it an urgent demand for immediate production.

Ready now, completely new . . . and *already proven* the ideal two-purpose tool for drilling bottom and top rock as well as coal with auger or hexagon steels, the new Thor No. 33 Sinker Rock Drill is here!

Lightweight—only 39 pounds furnished complete—it is amazingly easy to handle, packs exceptionally powerful rotation to turn auger steels through bony coal or rock . . . worming out cuttings dry without blowing, to reduce dust hazards. Also available for wet operation.

Study all these "*firsts*" in operating advantages you get with the new Thor 33—then call your nearest Thor representative or Thor branch office for further details.

INDEPENDENT PNEUMATIC TOOL COMPANY

600 West Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cleveland Detroit Los Angeles Milwaukee New York Philadelphia
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Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

NEW 5-POSITION THROTTLE

1 Stop
2 Blowing
3 Slow Drilling
4 Medium Drilling
5 Fast Drilling

NEW SHORT-TRAVEL VALVE

Lightweight
Fast Working
Large Bearing
Endless Life
Economical

NEW POWERFUL ROTATION

Exceptionally powerful. Turns auger steel with ease in bony coal or rock.

NEW SIDE EXHAUST

Deflects air from operator and from drilling face. Reduces dust hazard.

NEW FORGED STEEL RETAINER

Encased retainer springs. Easily operated by hand *for life of tool.* Essential *for augering operations.*

NEW LIGHTWEIGHT

Weighs 39 pounds as pictured—with "D" type handle, forged steel retainer and feet for sliding on planks . . . all standard.

NEW HANDLING EASE

Sliding lugs (or feet) retain steel alignment when tool is lying on a plank. Full grip on "D" handle in any position—no scraping of knuckles. Smooth *—minimum vibration.*

NEW GAUGED IMPACT

Fast, positive action with auger or hollow hexagon steel in coal and rock. Striking blow is gauged to prevent excessive auger steel breakage.

Plus THESE MINE-ENGINEERED FEATURES

AUTOMATIC LUBRICATION

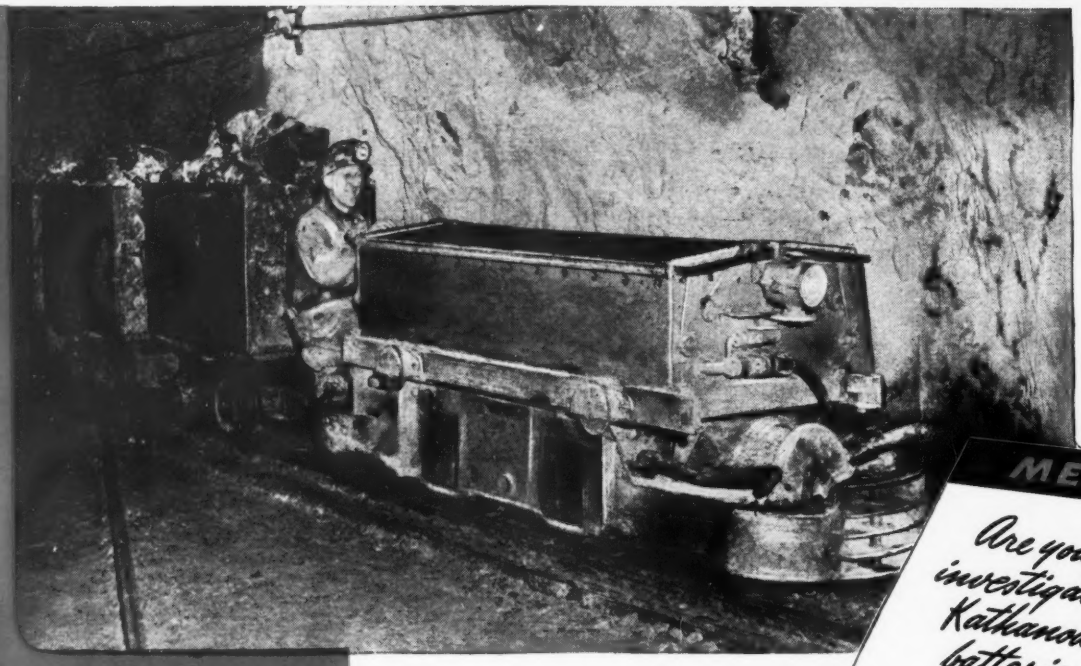
Ample reservoir in barrel provides steady, dependable lubrication to all moving parts of drill.

STURDY CONSTRUCTION

Every part a drop-forging of highest quality heat-treated steel, machined to closest tolerances.

LOW-COST REPLACEABLE CHUCK

Chuck is easily replaceable and especially low in cost for economical maintenance.



MEMO

Are you investigating Kathanode batteries?

GENERAL MANAGER

ARE YOU HAULING

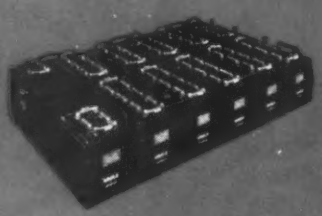
MAXIMUM TONNAGE?

Gould Kathanode power gives your mine locomotives extra flexibility. It has high current output to get heavily loaded trains under way and sustained voltage for fast runs to and from the tipple.

Gould Kathanode batteries meet extra power demands. One reason is the special design of the positive grid. Among other features this has double-wedge-type members. There is ample cross-section for conductivity, yet only a knife-like edge is exposed. Peroxidization cannot reduce battery efficiency prematurely.

Investigate Gould power for your mine locomotives. Write Dept. 1112 for Catalog 200 on Gould Kathanode Glassklad Batteries for Mine Locomotive Service.

KATHANODE GRID
Cast to a special design, the Kathanode grid retains its power-conducting capacity for the entire service life of the battery.



GOULD STORAGE BATTERY CORPORATION, Depew, N. Y.

Factories: Atlanta • Boston • Chicago Dallas • Depew • Leavenworth • Los Angeles • North Bergen • Rock Island Saint Paul • Salem • Sioux City Zanesville

GOULD

GLASSKLAD CONSTRUCTION

KATHANODE

3 Distinguished Members OF A FAMOUS FAMILY

WALWORTH Bronze Valves

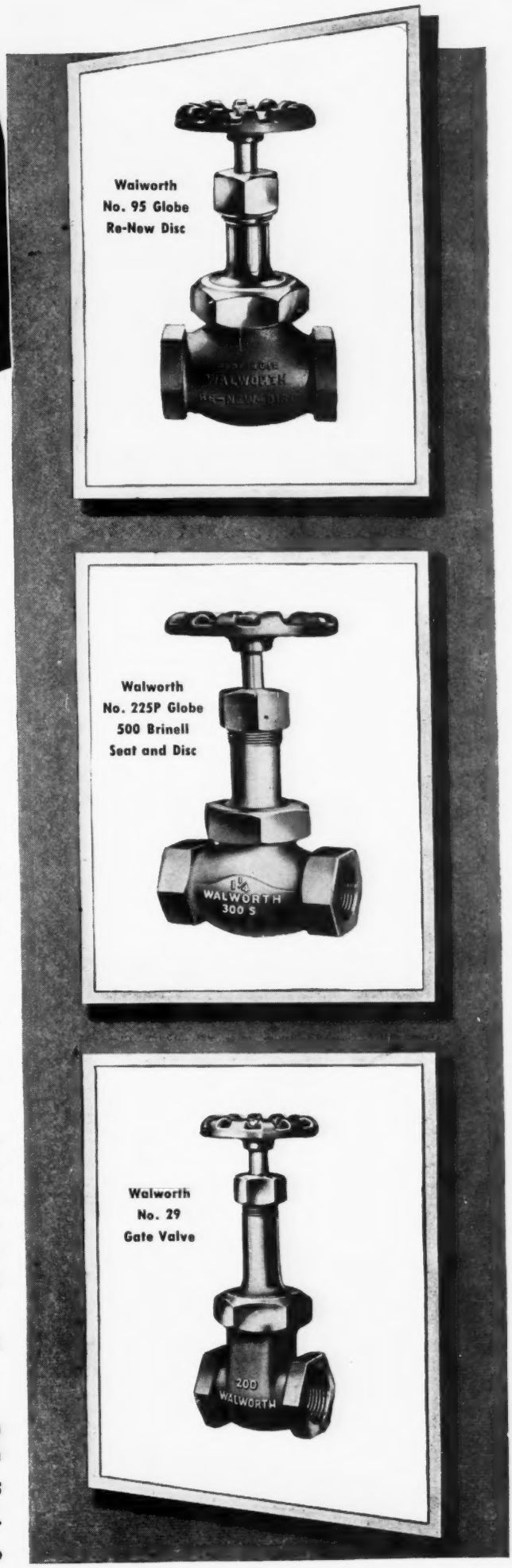
Walworth No. 95 can be used where throttling *is not* required. It is rated at 150 lbs. steam pressure at 500°F, and its improved renewable disc and lock-on, slip-off disc holder — an original Walworth development — saves time and trouble.

Walworth No. 225P is rated at 300 lbs. steam pressure at 550°F. With stainless steel, plug type discs — heat treated to a hardness of 500 Brinell — it can be closed on sand, slag, scale and similar flotage, without injuring the seating surfaces.

Walworth No. 29 is a double disc taper seat gate valve with a rising stem and union bonnet. It is rated at 200 lbs. steam pressure at 550°F. Valves can be repacked under pressure when fully opened.

These Walworth Quality Bronze Valves provide maximum protection against leakage by their union bonnet type construction, seats and discs of proper design, deep stuffing boxes, and tough bronze bodies. Further, they can be repacked under pressure when fully opened. Walworth Quality Bronze Valves are available in a full range of types and sizes, engineered to fit every service requirement.

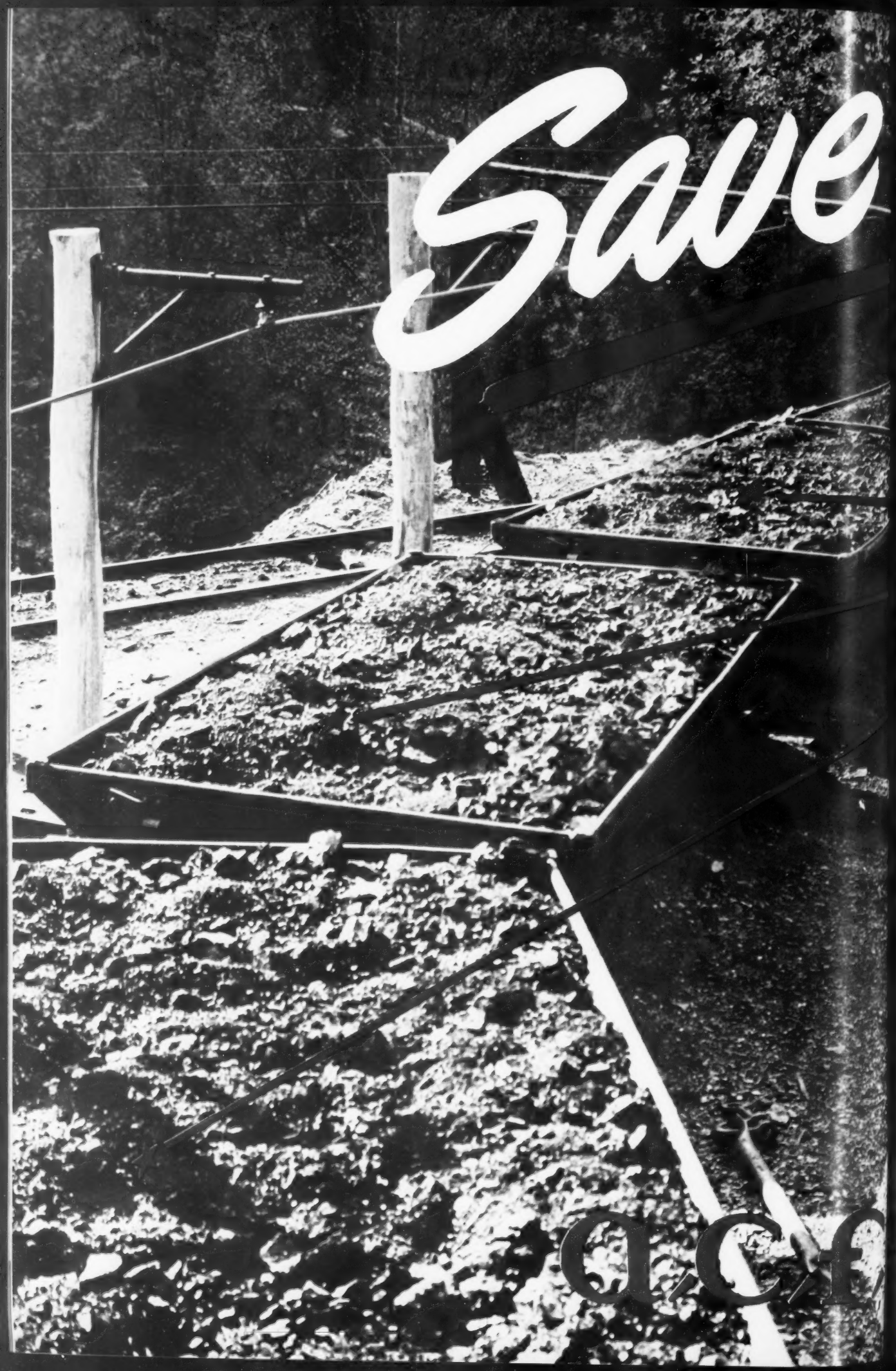
For full details, write today — on your company letterhead — for Walworth Catalog 42.



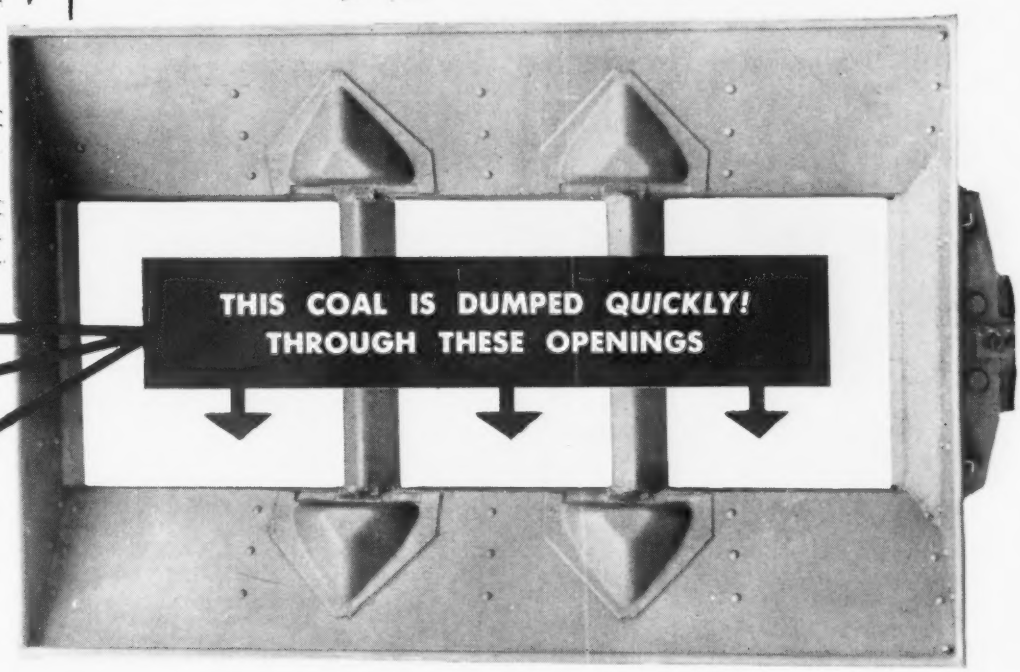
14 AWARDS TO 4 PLANTS

WALWORTH
valves and fittings
60 EAST 42nd ST., NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD


Save
acf

dumping time



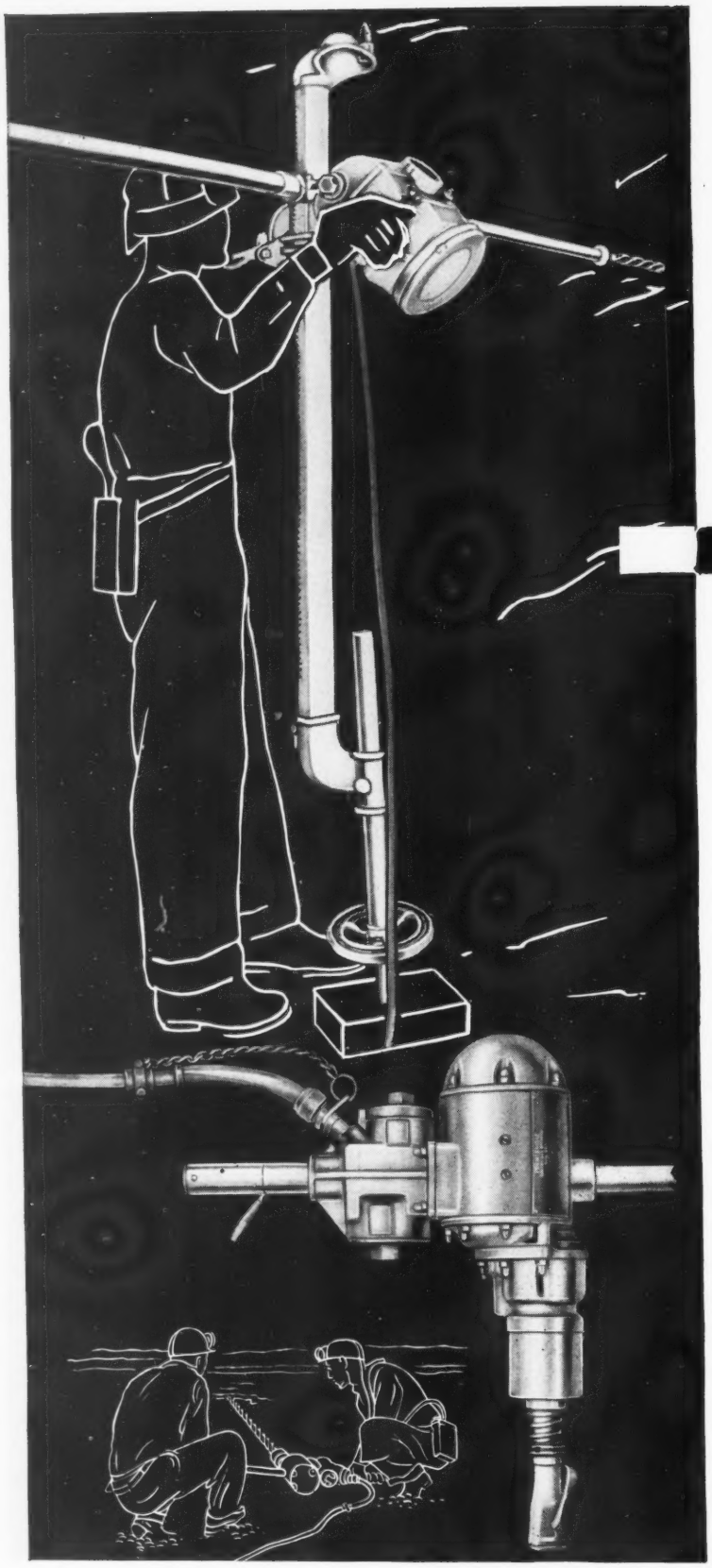
Note the smooth interior of this car, which allows coal to unload easily

A.C.F. Drop Bottom cars save valuable time in dumping, which permits quick return of cars to mine. This keeps loading machine efficiency higher and allows more car trips per shift — resulting in lower costs per ton of coal.

Our Sales Representatives will be pleased to show you A.C.F. drop bottom cars in active operation. Telephone or write our nearest sales office.

AMERICAN CAR AND FOUNDRY COMPANY

NEW YORK • CHICAGO • ST. LOUIS • HUNTINGTON, W. VA.
CLEVELAND • PHILADELPHIA • BERWICK, PA. • PITTSBURGH



world's largest line of electric coal drills

CP POST-MOUNTED AND HAND-HELD COAL DRILLS

WHATEVER your specific drilling conditions, there is a CP Electric Coal Drill to do the job swiftly — and economically. Noted for their flexibility and low maintenance cost, the four CP Post-Mounted models are furnished with the exact combination of motor, hook-up, post, clutch, boxing, thread bar, auger and cutter heads to meet individual requirements.

There are five CP Hand-Held Drills including the No. 572, illustrated, and the famous CP "Whippet"—the fastest, lightest and safest electric coal drill.

For full data on CP Post-Mounted Coal Drills, write for Catalog 901—on CP Hand-Held models, ask for Catalog 902 and S.P. 1995 describing CP "Whippet."

★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

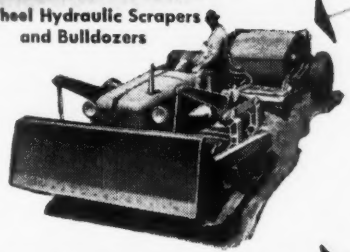
★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

GAR WOOD ROAD MACHINERY

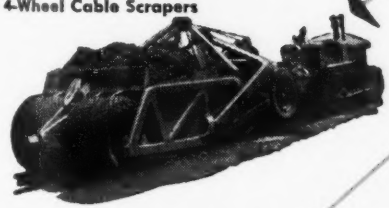
WITH ALLIS-CHALMERS DIESEL POWER

Puts you in the Driver's Seat

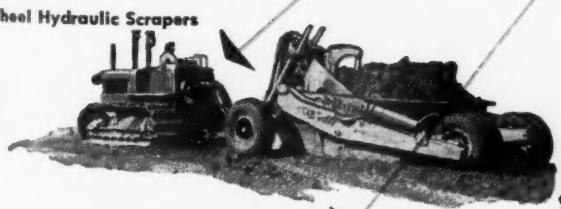
2-Wheel Hydraulic Scrapers and Bulldozers



4-Wheel Cable Scrapers

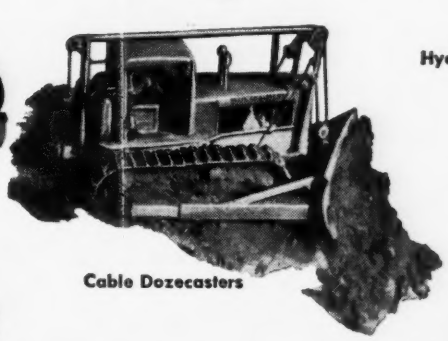


4-Wheel Hydraulic Scrapers



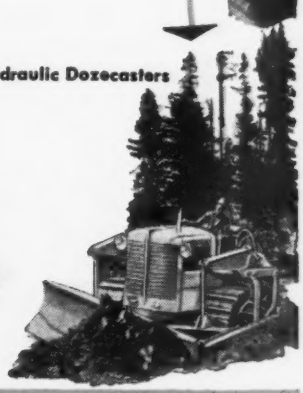
Heavy Duty Rippers

You're in full control of the yardage, the costs and timing of your earth moving jobs when you use Gar Wood Road Machinery. This equipment has proved its consistently high efficiency and complete reliability on thousands and thousands of jobs. It is the No. 1 choice of large numbers of users as shown by the present volume of orders—the greatest by far in Gar Wood history. It puts you in the driver's seat because it's built for the driver—to move the most earth with the least effort. Place your orders with your Allis-Chalmers dealer.



Cable Dozecasters

Hydraulic Dozecasters



Gar Wood Road Machinery is Sold Through ALLIS-CHALMERS Dealers Everywhere

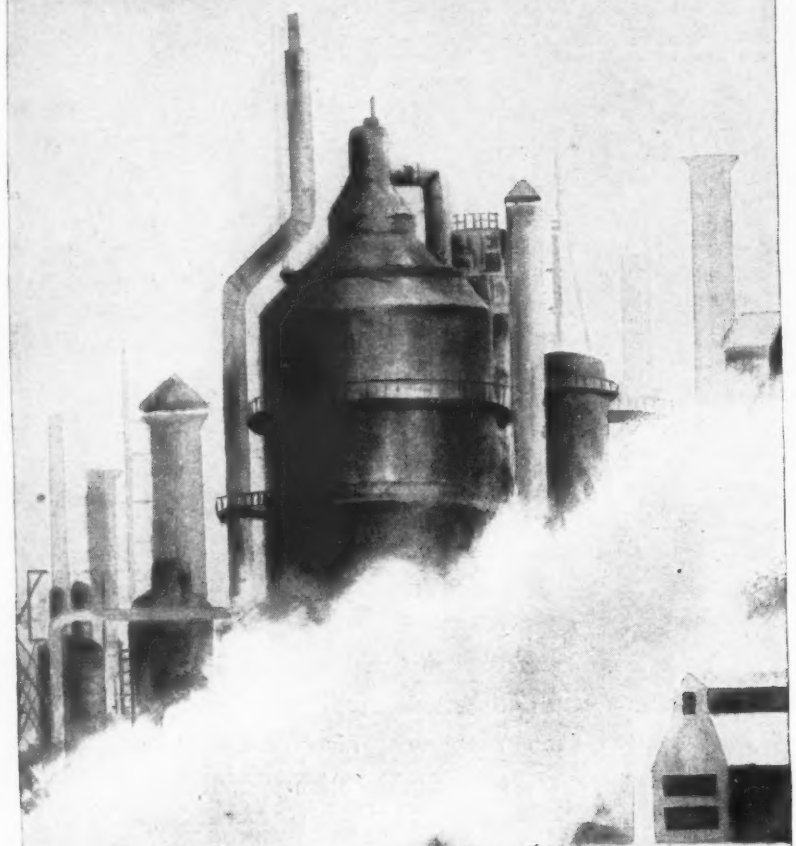
ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc.

DETROIT 11, MICHIGAN

OTHER PRODUCTS OF GAR WOOD INDUSTRIES INCLUDE HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS

BUY BIG TO KEEP HAULING COSTS SMALL



Wherever the job permits a choice between the use of one heavy-duty truck and several smaller ones . . . pick the big fellow. Save on first cost, maintenance, payroll, and reinvestment when you trade in.

Ward LaFrance heavy-duty trucks set a completely new standard of dependability, and delivered power per rated horse power. They are the peacetime equivalent of the great Ward LaFrance-built Army wreckers which made motor truck history all over the world.

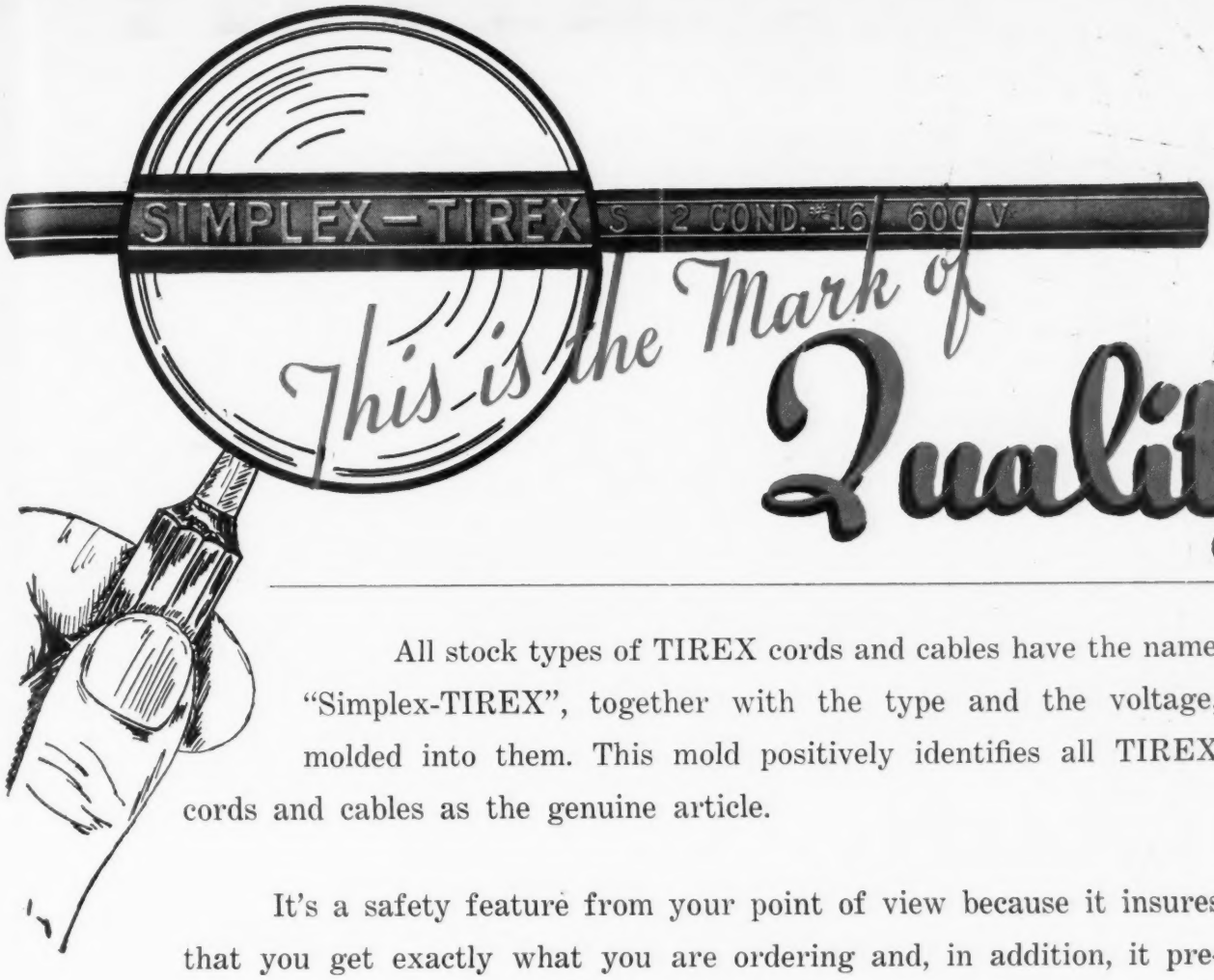
Every Ward LaFrance truck is a rugged truck . . . built *outsize* at the points where many trucks are likely to fail. For all heavy hauling operations on or off the road. Two, four or six-wheel drive.

If no dealer has been appointed in your community, write direct to Great American Industries, Inc., Ward LaFrance Truck Division, Elmira, New York.

Valuable franchises are available in a number of high-potential areas.

WARD LAFRANCE

THE NEW STANDARD FOR HEAVY HAULING



This is the Mark of Quality

All stock types of TIREX cords and cables have the name "Simplex-TIREX", together with the type and the voltage, molded into them. This mold positively identifies all TIREX cords and cables as the genuine article.

It's a safety feature from your point of view because it insures that you get exactly what you are ordering and, in addition, it prevents any question as to whether or not it is one size or the other. In other words, it is a positive index as to the size, number of conductors and the type. If the name "TIREX" is there it's your assurance that you are getting genuine Selenium Rubber Armored TIREX.

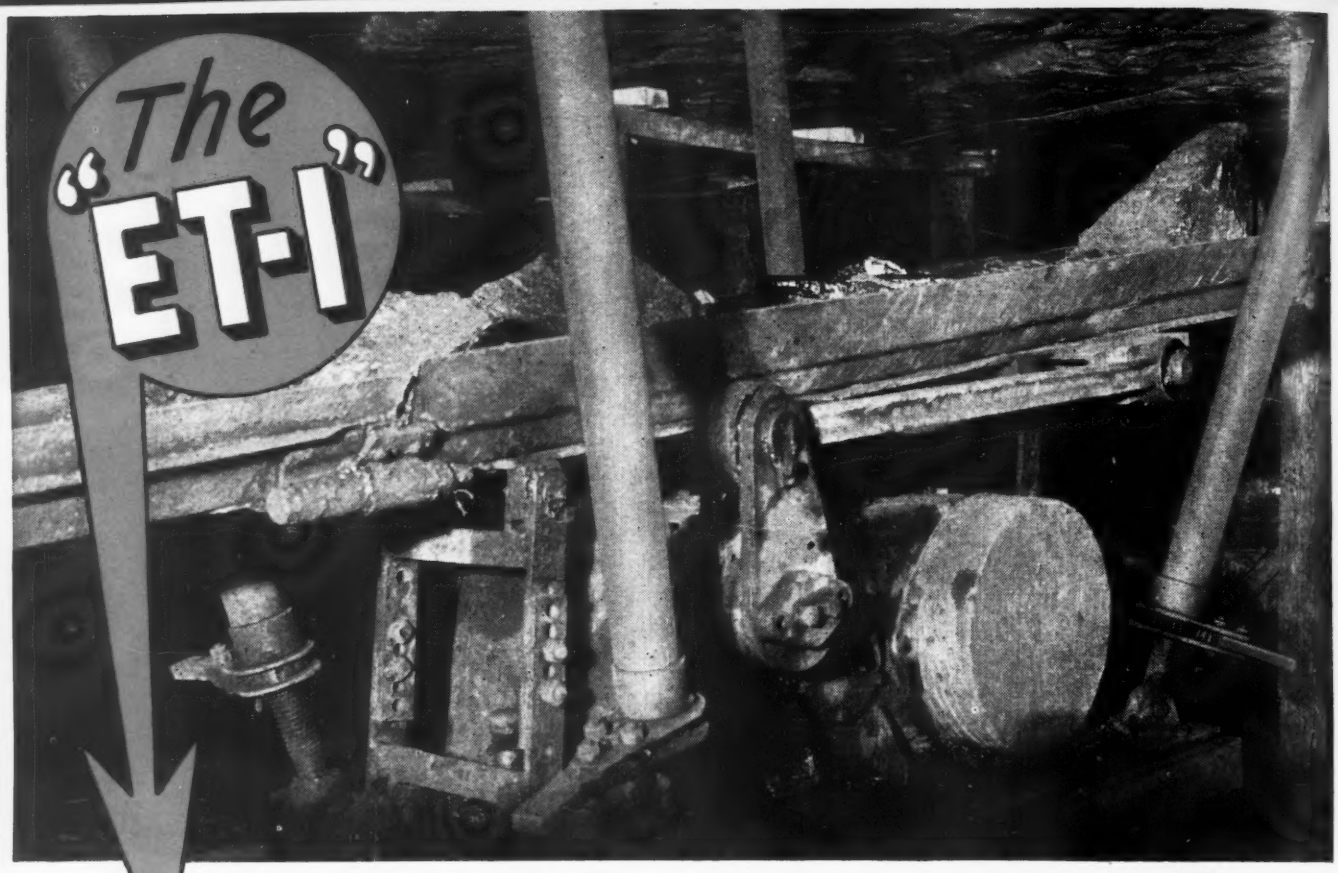
The next time you need portable cords or cables be sure you specify TIREX and then be sure you get it by insisting that the cord or cable you get is marked "Simplex-TIREX".

TIREX SELENIUM Rubber Armor

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

ARMY (E) NAVY

Simplex WIRES and CABLES



. . . . A Vulcan Shaking-Conveyor Drive with

EXTRA STRENGTH AND POWER

All Vulcan shaking-conveyor drives are tough and sturdy but the ET-1 was designed especially for jobs that require extra strength and power — and has thoroughly proved its money-saving superiority for a wide range of heavy-duty service.

Built like a battleship; with oversize heat-treated alloy-steel gears and shafts mounted on anti-friction bearings in an oil-tight cast-steel housing, it drives several hundred feet of heavily-loaded chute for long periods of time without need for any other attention than occasional lubrication. When necessary, it can be used successfully on adverse grades, as shown in the illustration above.

Write us regarding any coal or rock-handling requirement. We not only manufacture a widely-used and highly-developed line of Shaking-Chute Conveyors but also an equally complete and service-proved line of Underground Chain Conveyors, so that our experienced engineers can afford to be absolutely impartial in their recommendations. Bulletins containing complete working data mailed promptly on request.

VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
Coal-Preparation Equipment

Steam Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
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Ball, Rod and Tube Mills

GULF E. P. LUBRICANTS

provide better lubrication for reduction gears in cleaning plants and tipples

You get three important advantages:

Greater Protection!

Easier starting!

No foaming!

TO MEET THE URGENT NEED for coal, most operators of cleaning plants and tipples find it necessary to overload equipment. Now more than ever the most efficient lubrication is required to prevent breakdowns that mean lost tonnage and high maintenance expense.

Gulf has a complete line of quality lubricants that will help you insure continuous operation of your preparation equipment under severe conditions. For reduction gears, the Gulf Service Engineer usually recommends Gulf E. P. Lubricants.

Gulf E. P. Lubricants are of the lead naphthenate type, recognized as superior to other types in performance, effectiveness, stability, and lubricating value. Gulf E. P. Lubricants are tenacious, extremely stable, separate readily from water, have a high viscosity index, are noncorrosive and nonfoaming. They are manufactured in a wide range of consistencies to meet your every requirement.

Call in a Gulf Service Engineer today and ask him to demonstrate how these superior lubricants can help you get trouble-free service from your reduction gears and lower maintenance costs. Or send the coupon below for further information.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
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GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company CA
3800 Gulf Building, Pittsburgh 30, Pa.

Please send me, without obligation, complete information on Gulf E. P. Lubricants.

Name.....

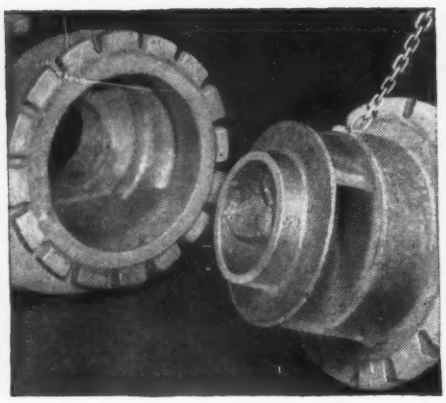
Company.....

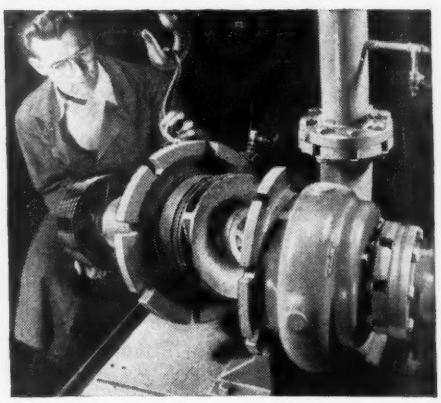
Title.....

Address.....

2 to 4 Times LONGER LIFE

With A-C's Great New "Solids-Handling" Pump —That Cuts Parts Inventory as Much as 2/3 —And Materially Reduces Down-Time!

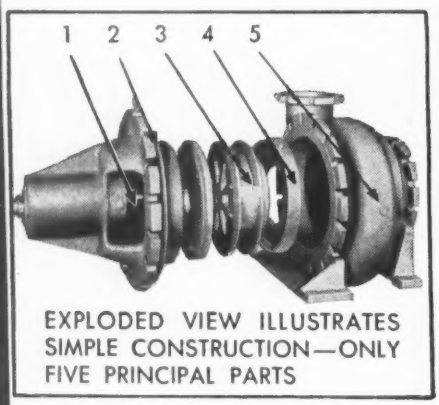




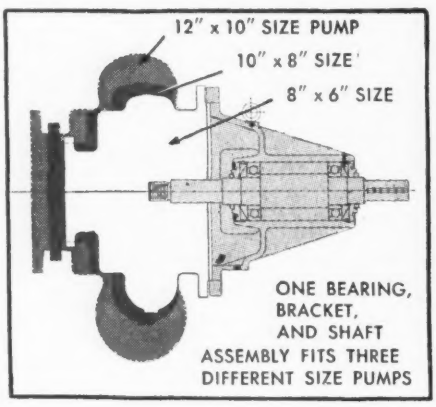
1 Continuing research plus field reports *prove* that *new* design and *special* alloys increase pump life 200 to 400%! Here, an impeller is weighed after test run to determine loss by abrasion. For *more* proof . . .

2 In a coal plant this 10" x 8" pump handled high percentages of solids for 150 days. Dismantled, it showed only *negligible* signs of wear. This plant is *sold* on long life, low down-time — but that's not all . . .

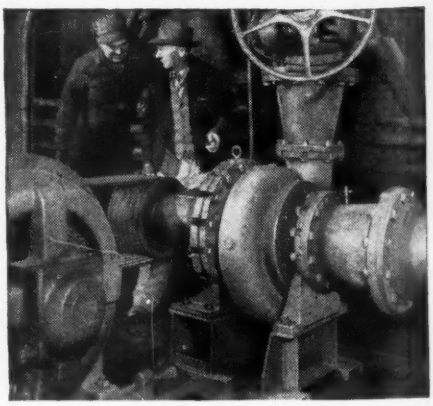
3 They like the *simplicity* of this new pump . . . fact that they can remove *entire* rotating element without disturbing suction or discharge piping. And that means *ease of accessibility.* It also means . . .



EXPLODED VIEW ILLUSTRATES SIMPLE CONSTRUCTION—ONLY FIVE PRINCIPAL PARTS



ONE BEARING, BRACKET, AND SHAFT ASSEMBLY FITS THREE DIFFERENT SIZE PUMPS



4 Where a *number* of pumps are used, parts inventory can be reduced much as 2/3; and *materially,* where only 1 or 2 are used. One reason: this pump has up to *50% fewer parts* than other pumps. Another . . .

5 Comparable size pumps of different ratings have interchangeable parts. Example: 8x6, 10x8, 12x10 sizes have *same* bearings, bracket, shaft assembly. You stock *1* set of parts for *3* pumps! Adding 'em all up you get . . .

6 Longer life, fewer parts, less down-time—*lower cost per ton of solids handled than with other makes!* What's more, A-C's "Solids-Handling" Pump compares favorably in price with ordinary high efficiency pumps.

A 1911

WANT MORE FACTS? Call this experienced engineer in your nearby A-C district office. Discuss your pumping problem with him. Or, Write direct for Bulletin B6381. ALLIS-CHALMERS, MILWAUKEE, WIS.

ALLIS-CHALMERS
"Solids-Handling" Pumps

how to keep OLD motors YOUNG

Why more Westinghouse **SK Motors** are used in coal mines today than all other makes combined

One-piece rolled steel frame—with drop-forged steel feet welded to frame, gives great mechanical strength.

Separate coil units—shunt, series and commutating coils are wound and insulated as separate units, simplifying replacement.

Sealed-sleeve bearings—with exclusive Westinghouse vestibule seal, keep oil inside, keep dust and dirt outside.

Form-wound armature coils—on larger sizes are insulated with specially selected mica on slot portion and dipped and baked in long life varnish. Smaller sizes have mush-wound coils.

Readily accessible brushes—easily adjusted or removed. Any one brushholder can be removed without disturbing others.

Field coils—wound on a one-piece Micarta shell with end washers punched to exact size, protecting the coil against dirt and moisture.

Commutators—made of punched hard drawn copper for uniformity, better commutation and longer brush life.

Whether it's 10 years old . . . or 20 . . . or even if it's one of the first SK Motors ever installed back in 1911, the same replacement armature will fit. This is true also of armature coils, field coils and sealed-sleeve bearings—to keep older models always modern in performance.

This is true of SK Motors because the basic construction has always been kept the same, and because all improved parts have been designed to fit former models of the same rating and frame size. To the user, this means greatly simplified maintenance and the smallest of parts stocks.

Furthermore, SK Motors have been unsurpassed in dependability and economical service throughout the 34 years that they have been a coal industry standard. For further information, see your Westinghouse representative, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21361

Westinghouse

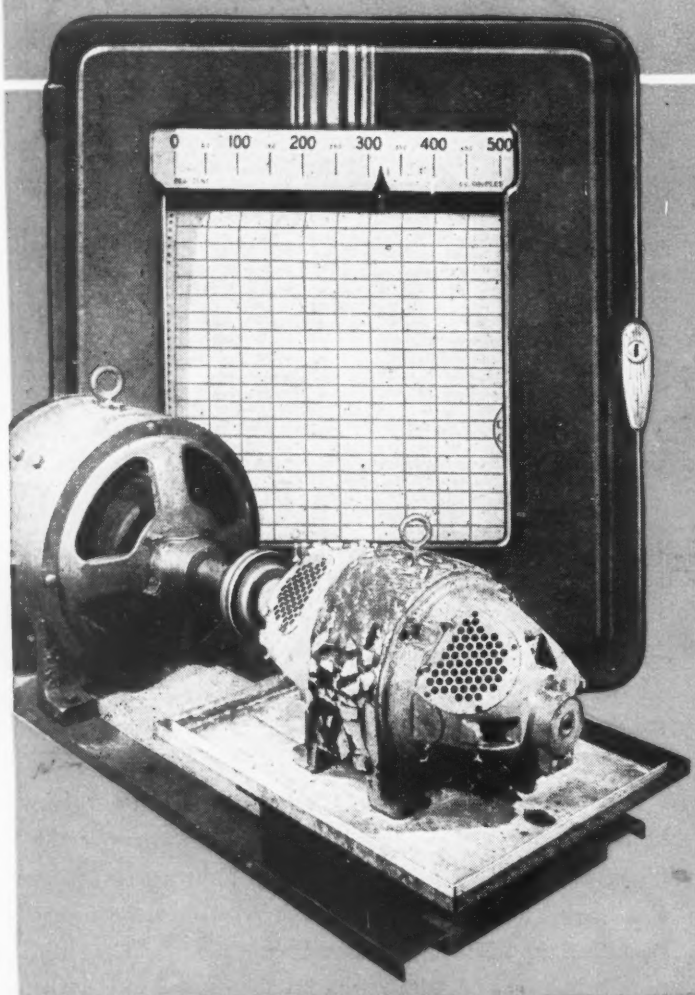
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

SK MINING MOTORS

DOW CORNING

SILICONES increase permissible operating

temperatures by more than 100°C.



Today many accepted engineering limitations are being swept away by revolutionary new Dow Corning silicone materials. Designers are making major product improvements—coupled with important economies—never before possible.

Here's a specific example. Dow Corning varnishes and resins—because of their unique resistance to high temperatures—make it possible to redesign or rewind electrical equipment for increased horsepower output per unit weight. At the same time they greatly prolong equipment life under adverse operating conditions and reduce overload failures and fire hazards.

The recent development of DC 996, a Silicone Varnish which cures at 300°F., enables any electrical maintenance or rewind shop to secure the greater operating economies of Silicone Insulation.

In other industries Silicone materials also make possible operations which were previously impossible or very expensive. Consult Dow Corning for particulars.

IN THE ELECTRICAL INDUSTRY, FOR EXAMPLE

This test motor wound with Silicone Insulation has been alternately saturated with moisture and operated at 310°C. (590°F.) by resistance, for a total of 2,000 hours with no sign of failure. Silicone Insulation means reliable and continuous operation under most adverse conditions.

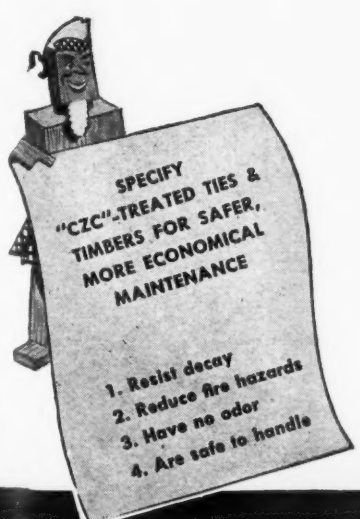
DOW CORNING CORPORATION
MIDLAND, MICHIGAN
NEW YORK OFFICE: EMPIRE STATE BUILDING

Dow Corning

FIRST IN SILICONES

Can safety and economy go together?

Failure of an untreated post *from decay after one year. The post on the left was placed at the same time but was treated with CZC.*


SPECIFY
"CZC"-TREATED TIES & TIMBERS FOR SAFER, MORE ECONOMICAL MAINTENANCE
1. Resist decay
2. Reduce fire hazards
3. Have no odor
4. Are safe to handle

THE BOOKLET, "Wood Preservation for Mines," tells how you can save money on mine ties and timber and increase safety at the same time.

It includes photographs and charts giving comparative facts and figures on life expectancies of untreated timber and lumber that has been pressure impregnated with CZC (Chromated Zinc Chloride) to resist decay and reduce fire hazards.

Learn these facts *now*. Then when you need or can get new timber, you'll be ready to use CZC to your best advantage. Fill out and mail the coupon below today.

TO CONSERVE—PRESERVE!

DU PONT CZC

(CHROMATED ZINC CHLORIDE)

WOOD PRESERVATIVE

DU PONT BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington 98, Delaware.

Please send me your booklet, **"Wood Preservation for Mines."**

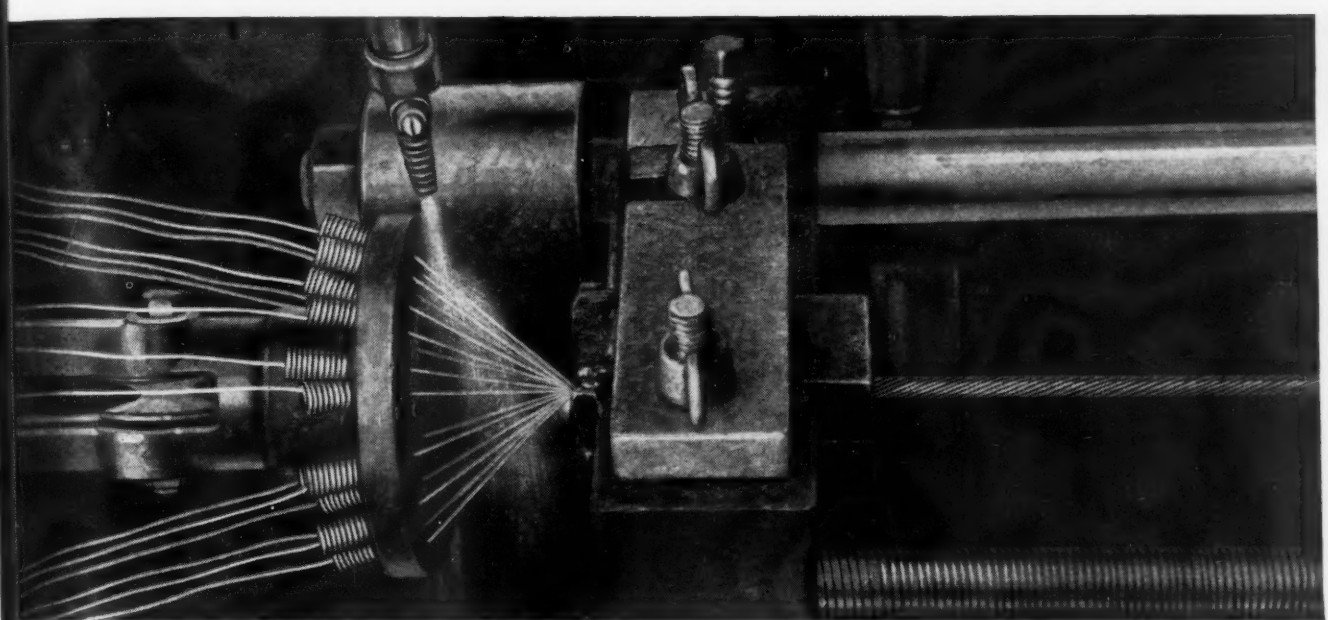
Name_____

Address_____

City or Town_____ State_____

BOSTON WOVEN HOSE
TRADE
MARK
AND RUBBER COMPANY
Merry Christmas

The Lubricant Bath that makes Upson-Walton Wire Rope give Better Service



EVERY wire in any length of Upson-Walton wire rope —and there may be 200 or 300 of them—is a *live* wire in the sense that *all are in motion when the rope is operating.* Every time the rope flexes, every wire in it moves.

Upson-Walton pre-lubrication therefore is of crucial importance to:

1—Prolong the life of the rope

2—Retard corrosion

3—Reduce friction within the rope itself and thereby prevent excessive wear, wire on wire and strand on strand.

Every foot of Upson-Walton wire rope is subjected to a pressure bath of lubricant, actually built into the rope in manufacture. By this method (illustrated above), every wire in every strand is surrounded with lubricant; every void between strands is a reservoir of lubricant and the core itself is *saturated* with lubricant.

The practical effect of pre-lubricating, as performed by Upson-Walton, is this:

1—It permits a better balanced loading of the rope.

2—Weight is distributed more equally between *all* wires; no one wire bears an excessive share of the load.

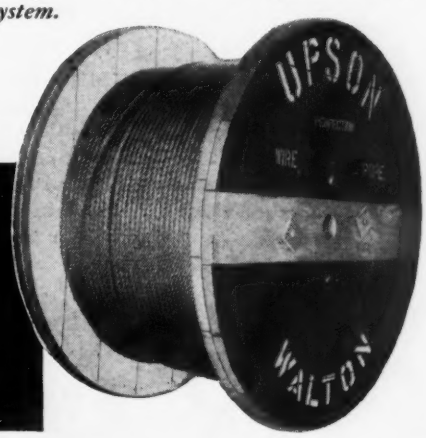
3—Every wire helps hold the load by easily slipping into the position where it helps the most.

4—The rope can develop its full maximum strength and sustain greater loads than rope which might not be as efficiently pre-lubricated.

It pays to specify Upson-Walton wire rope—*with the built-in lubrication system.*

Established 1871

Specify Upson-Walton LAYRITE when you want PREFORMED



THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

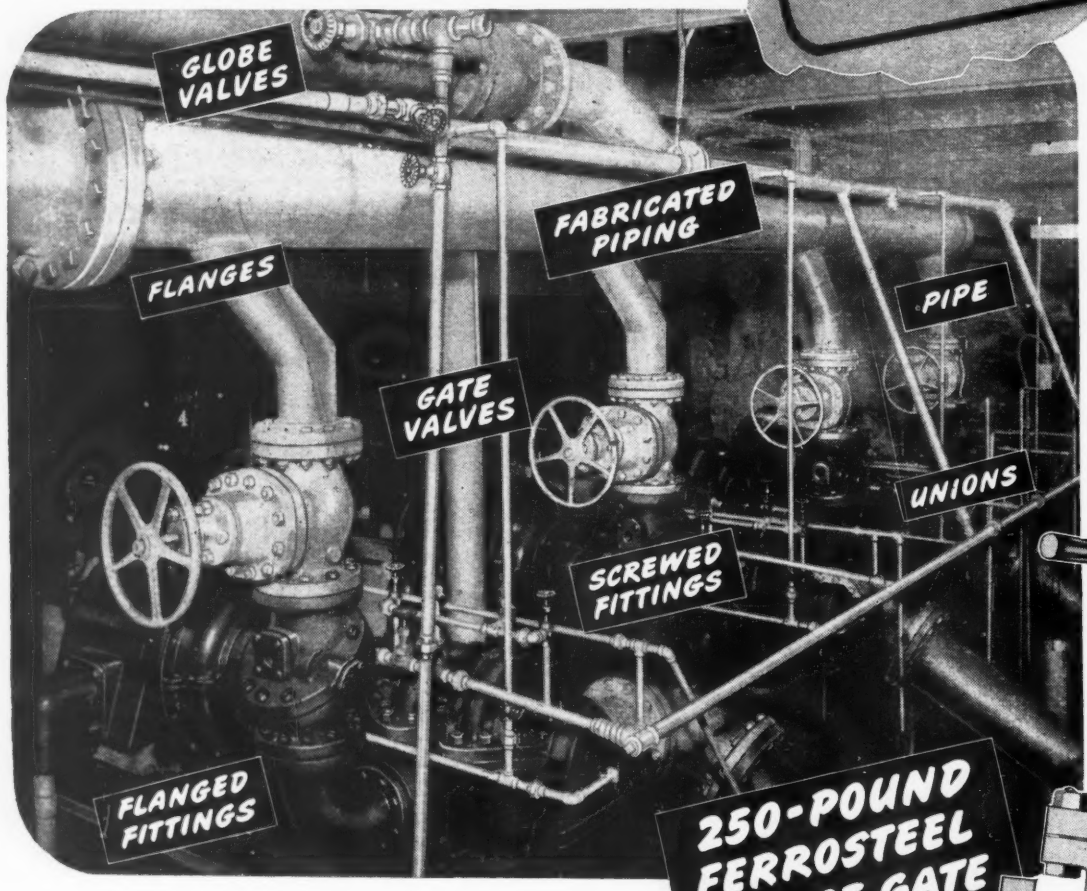
MAIN OFFICES AND FACTORY: CLEVELAND 13, OHIO

114 Broad Street, New York 4 · 737 W. Van Buren Street, Chicago 7 · 241 Oliver Building, Pittsburgh 22

Below or above ground . . . the CRANE line meets all Piping needs

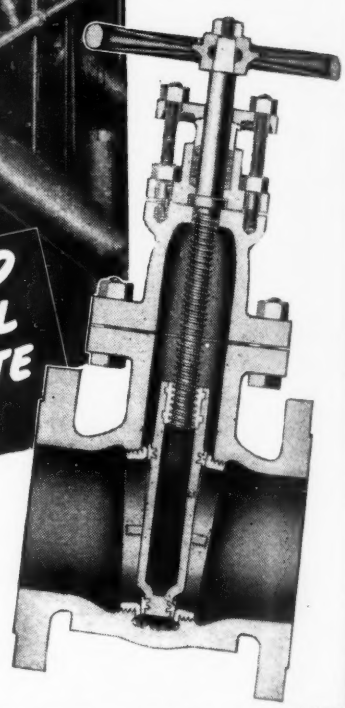
Air line, water line, steam piping system or any other—new installations or replacement work—the whole job is simplified when the Crane line is your partner. You specify all equipment to exact requirements from the world's most complete selection of valves, fittings, pipe, accessories, and fabricated piping. Everything for the job comes from a single source—your Crane Branch or Wholesaler—to save you time and trouble in ordering. One dependable quality in all materials—and one responsibility for them—assures your getting installations that keep working longer at lowest cost. As one example of the adaptability of Crane valves for mining services, see below.

ONE SOURCE OF SUPPLY
ONE RESPONSIBILITY
ONE STANDARD OF QUALITY



Pump room in a lead mine

250-POUND FERROSTEEL WEDGE GATE VALVES



SERVICE RECOMMENDATIONS:

Crane 250-pound Ferrosteel Wedge Gate Valves are recommended for services that are too severe for Standard Weight valves but where the use of steel valves is not required. Brass trimmed or all-iron. Working pressure ratings: 250 pounds steam; 500 pounds, cold. Ideal for oil, water, steam and other fluids that do not corrode brass or iron. Made in O.S.&Y. and in Non-Rising stem patterns; with flanged ends up to 12 in.; with screwed ends up to 4 in. Listed on pages 110 and 111 of your Crane Catalog.

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. • *Branches and Wholesalers Serving All Industrial Areas*

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

When the Job calls for CONVEYORS . . .

Smooth, continuous flow of coal from the face—that's the secret of higher tonnage quotas and lower production costs! And when conditions require the use of chain type conveyors to secure that flow, La-Del is the logical choice. Here's why:

La-Del Chain Type Conveyor sections are manufactured to close tolerances, permitting quick, easy interchangeability to meet varying conditions. All power transmission parts are oversize for long-life, trouble-free service. Drives may be mounted on either side of conveyors and are reversible, providing two-way service for handling supplies. Compact and lightweight, La-Del Chain Conveyors are easily installed, can be moved about with but little time and effort . . . these chain conveyors will operate efficiently under the most difficult conditions.

Let La-Del Installation Engineers show you how La-Del Chain Conveyors can move more coal . . . in less time . . . at lower cost. La-Del Conveyors, engineered to the job, work equally well with mechanical or hand loading. It will pay you to "Look to La-Del" NOW!

LA-DEL EQUIPMENT INCLUDES . . .

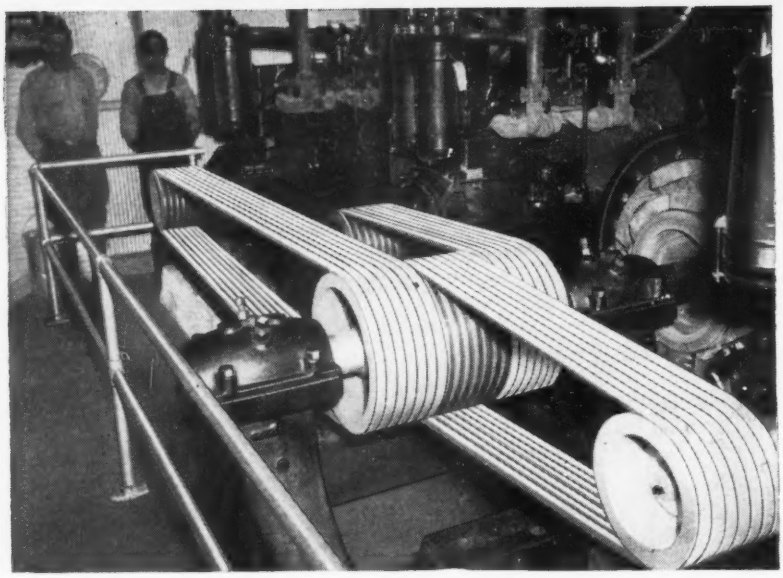
Belt Conveyors • Shaker Conveyors • Elevating Heads Pit Car Loaders • Mobile Loading Machines • La-Del Trailer Ventilating Fans and Blowers and La-Del Experienced Engineering Counsel, Before and After Installation.

MATERIAL HANDLING LA-DEL MINE VENTILATION

LA-DEL CONVEYOR AND MANUFACTURING CO.

New Philadelphia, Ohio

COMPLETE LINE OF UNDERGROUND CONVEYORS FOR LOW COST OPERATION



All Gates V-Belts are Built With

The Patented
CONCAVE SIDE

There's a very definite reason for this fact

Your GATES VULCO ROPES

Are Today Making Performance Records *NEVER EQUALED* by *ANY* V-Belts Before!

Early in the war, it became perfectly clear that Army tanks, tractors and self-propelled big guns in *combat service* simply *had* to have V-Belts of greater strength and durability than had ever been built before. Gates developed these greatly superior V-belts through intensified, specialized research — and here is why this fact is now important to YOU:——

Here is the reason

Every improvement developed by Gates for these Army V-belts has also been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.

Here is one of the very few instances in which improvements developed primarily for military use could be passed on *immediately* to you. Ordinarily, *you* would have had to wait. An exception was made in the case of Gates V-belts because it was recognized that industry needed the best possible V-belts in order to achieve the greatest possible production—and maximum production was vitally essential.

That is why Gates has been able to pass on to you, day by day, every V-belt improvement developed for our armed forces during the war — and that is why your *Standard* Gates Vulco Ropes are today outperforming *any* V-belts ever built before!

Gates — THE MARK OF SPECIALIZED RESEARCH

THE GATES RUBBER CO.

Engineering Offices and Jobber Stocks in All Large Industrial Centers

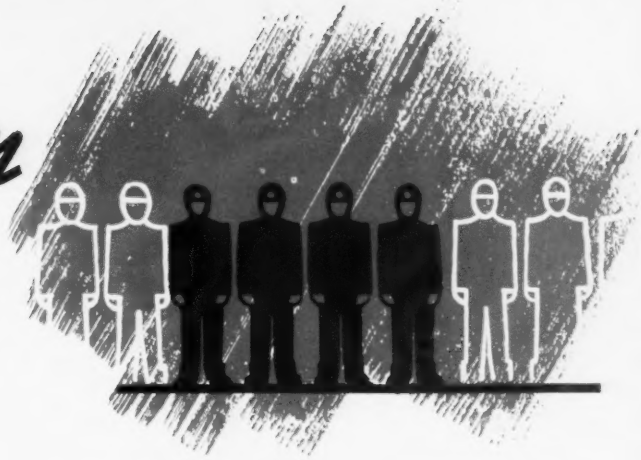
4512

GATES VULCO ROPE DRIVES

CHICAGO 6, ILL., 549 West Washington. NEW YORK CITY 3, 215-219 Fourth Avenue. ATLANTA 3, GA., 521 C. & S. Nat'l Bank Bldg.
LOS ANGELES 21, CAL., 2240 E. Washington Blvd. DENVER 17, COLO., 999 S. Broadway. DETROIT 2, MICH. 223 Boulevard Bldg.
PORTLAND 9, ORE., 333 N.W. 5th Ave. DALLAS 2, TEXAS, 1710 N. Market St. SAN FRANCISCO 3, CAL., 170 Ninth St.

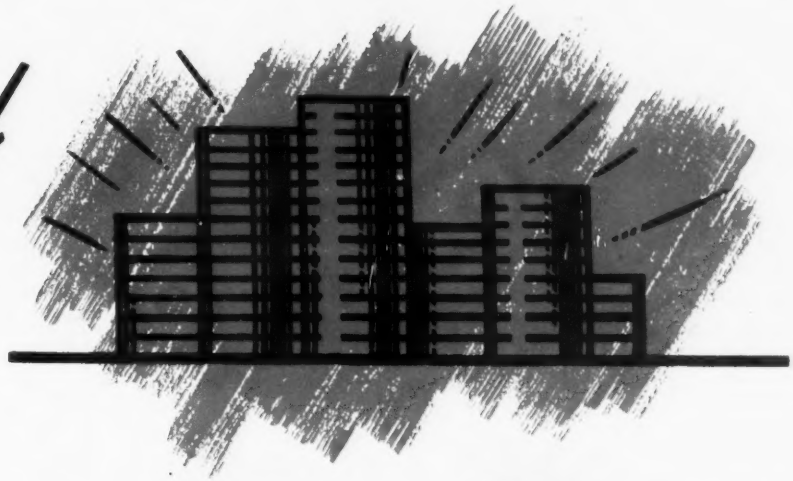
Mechanization

IS THE ANSWER to labor shortage.
Mechanized mines produce more coal with less manpower.



Mechanized

PREPARATION WILL WIN the better markets for you—when intensive competition resumes.



To Make More Money
...MECHANIZE!

MORE THAN ⅓ of all the mines in this country had mechanized below and above ground before the war—for only one reason—because *mechanized* they make more money.

They produce more, *better prepared* coal with fewer man hours—and—with better prepared coal, they get *higher prices!*

A large percentage of all the mechanized mines have been Morrow equipped—because Morrow Tipples improve coal quality, raise product value and cut operating costs. Morrow *streamlines* production from the mines to cars and barges in shorter time, at lower cost—in the best condition to SELL!

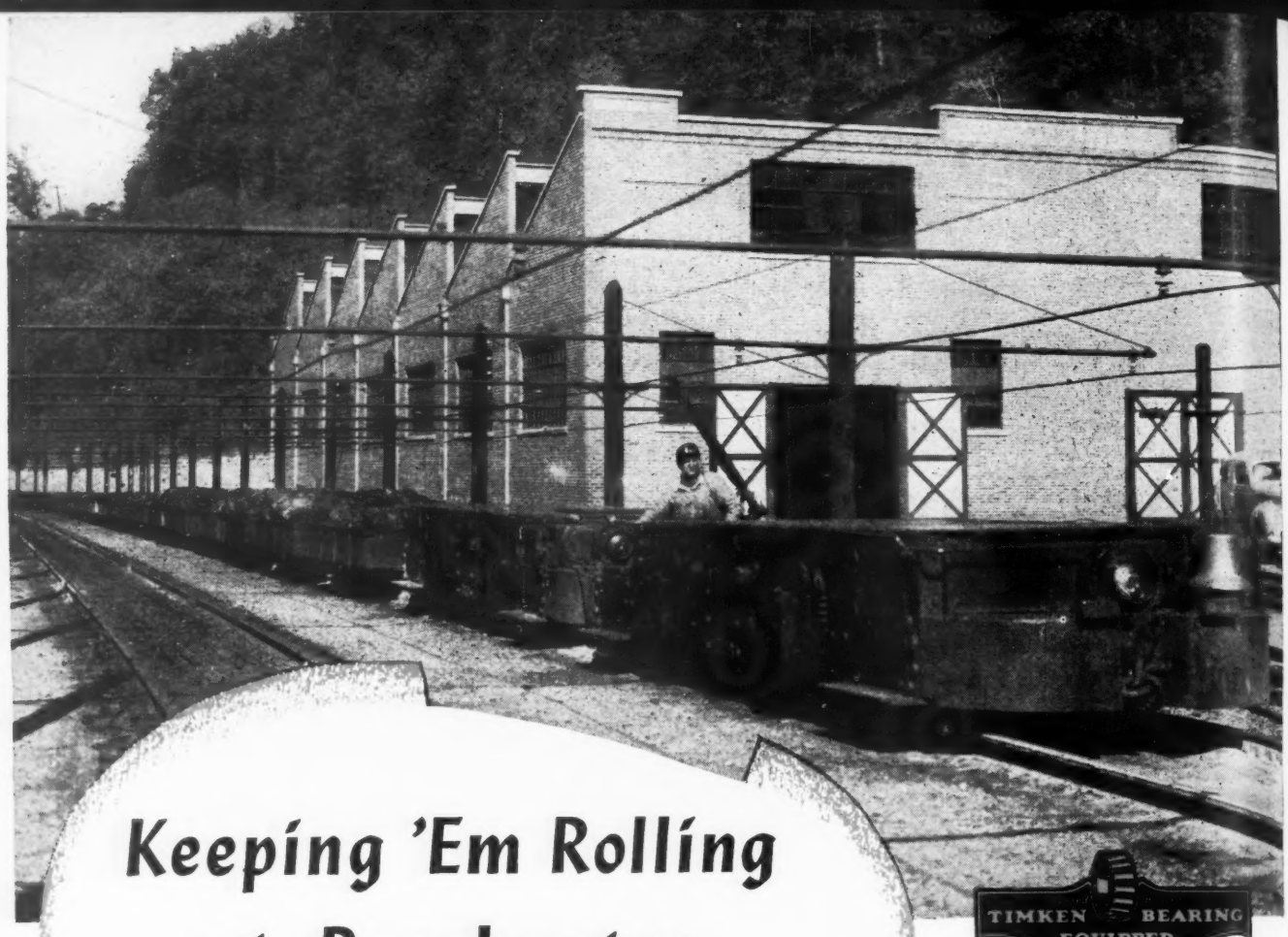
★ ★ ★

MORROW ENGINEERS ARE AVAILABLE NOW and ready to work with you. Write The Morrow Manufacturing Company, 1950 Ford Blvd., Wellston, Ohio. *Division The Wacker Corporation.*

Better Preparation
=INCREASED SALES!
1. low impurity content
2. correct sizing
3. high uniformity

MECHANIZE WITH MORROW

COAL WASHERS • WEIGH PANS • FEEDERS • DUMPS
BINS AND BIN GATES • FLANGED LIP SCREENS
CONVEYORS • LOADING BOOMS • SHAKING SCREENS
VIBRATING SCREENS • CAR HAULS • PICKING TABLES
SETTLING TANKS • ELEVATORS • CAR RETARDERS
PERFORATED METAL SCREENS • STEEL STRUCTURES



Keeping 'Em Rolling at Pocahontas Fuel Company

The Bishop, Virginia, mine of the Pocahontas Fuel Company, where the above photograph was made, is one of the largest coal shippers on the Norfolk & Western Railroad. This mine also is one of the most modern of bituminous mines, as may well be gathered from the picture.

Transportation is effectively and economically handled by 850 large, all-steel, four-axle mine cars equipped with Timken Tapered Roller Bearings. This mine first started producing coal in the year 1931, or when the initial order of 300 cars was placed in service. To date, the bearings have never faltered in any of the cars, including the first lot of cars that has now operated continuously for 14 years.

No other kind of bearings ever have equalled this performance in mine cars, nor have even approached their record of service in more than 1,000 mines. Specify "Timken Bearing Equipped" when buying new mine cars; see that the trade-mark "TIMKEN" is stamped on every bearing that goes in the equipment you manufacture. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Is your Job too tough for your truck?...

No matter how little it cost when new—if your truck is not tough enough for your job *it will cost too much in the end.*

There's only one "bargain" in trucking—and that's *extra work for your money.*

This is why Mack trucks are built the way they are. It's why, for instance, Mack uses Tetrapoid rather than conventional gears—rubber Shock Insulator rather than conventional spring shackles—wrist pins precision-finished to two ten-thousandths of an inch.

When you build a truck this way *it gives its owner extra work.* It stays on the job *longer.* It is in the repair shop *less. It costs less in the end.*

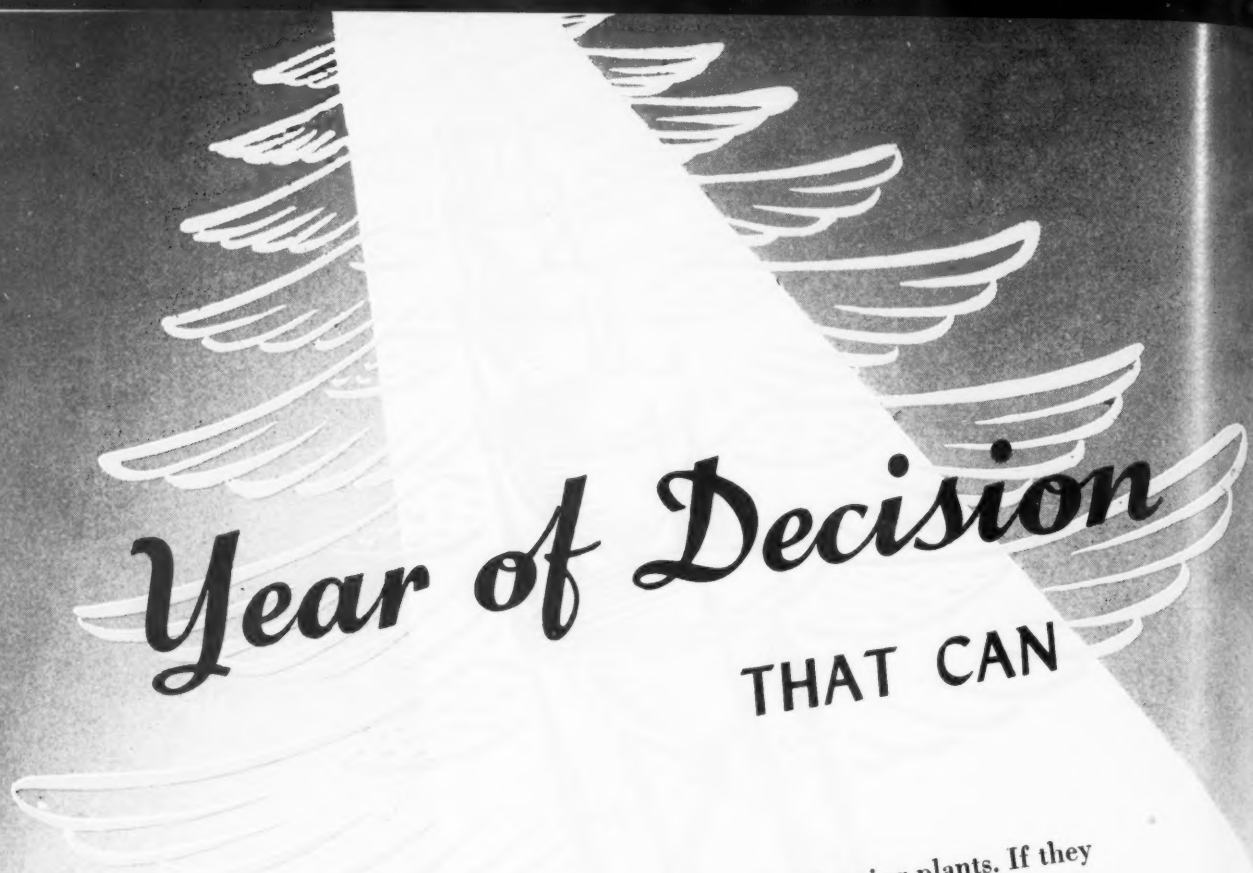
If your trucks give you too much trouble—if repair costs are excessive and service interruptions too frequent—then ask yourself if maybe you're not just using *too little truck for the job!*

If the answer's "*Yes!*"—then you need a Mack. It pays off in work on the job.

Mack Trucks, Inc., Empire State Building, New York 1, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

Mack
TRUCKS
FOR EVERY PURPOSE

Performance Counts!



Year of Decision

THAT CAN

In 1946 many mines will award contracts for cleaning plants. If they test wisely and choose well, these mines will be shipping profitable premium-grade metallurgical, steam or domestic coal long after this period of unprecedented demand has passed.

But time is running out, as each new coal preparation plant gets under construction or under way. 1946 is the YEAR OF DECISION . . . for the days when the nation's shelves and bins will be full and competition again becomes keener.

We believe Heavy-Media Separation has marked advantages over previous preparation methods, particularly in treating coal with a high-percentage of near-gravity material, with high and variable percentage of refuse and where the feed must be cleaned at a wider range of gravities . . . both higher or lower . . . than previous processes.

Our beliefs are based on these simple facts:

Heavy-Media Separation operates at equal efficiency of separation on any fragmentary materials requiring separation based on specific gravity differences in the range of 1.25 to 3.40. It makes a sharp, uniform separation at the desired gravity . . . which can be maintained continuously within ± 0.01, or quickly and easily changed to suit varying characteristics of the feed coal.

AMERICAN CYANAMID COMPANY

AFFECT PROFITS FOR A DECADE TO COME

Heavy-Media Separation plants can be designed for multiple-product separation from run-of-mine feed in a full size-range to meet any present or future standard in any coal market. By continuous reclamation, loss of the low-cost medium is negligible. Plants can be started or shut down without bank-loss of coal or medium or plant efficiency. Equipment is standard and proved by years of operation.

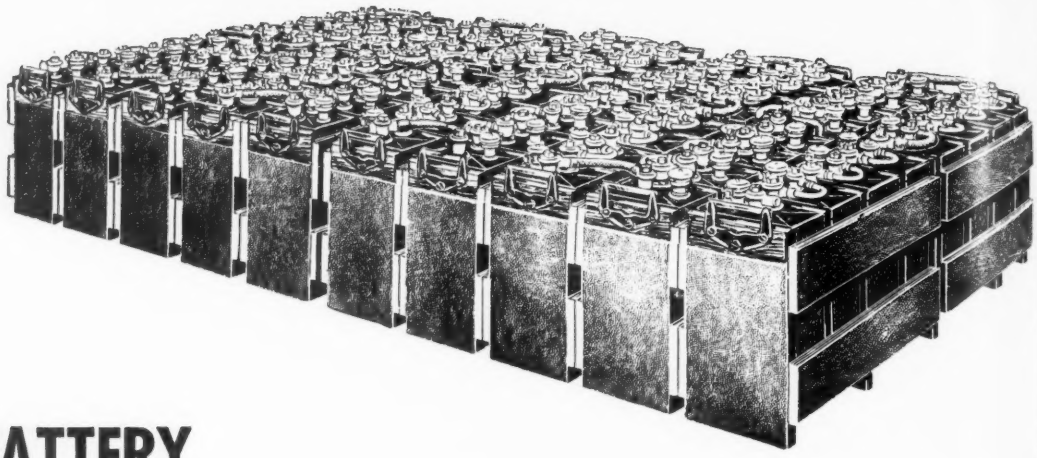
These are the facts, exactly as we know them . . . confirmed by testing carload lots from the mines of a substantial number of leading coal producers . . . accepted as the basis for Heavy-Media Separation cleaning plants now being designed.

But because a cleaning plant often is a once-in-a-lifetime investment, many operators, naturally adopt a "wait and see" attitude . . . commendably conservative, if time does not run out.

It takes time to run Heavy-Media Separation tests, to design a cleaning plant, to let contracts. More time to break ground and build. 1946 is the YEAR OF DECISION—while markets are assured and there's still ample time to forestall the penalty of low quality in the competitive days ahead.

Cyanamid welcomes the opportunity to work with you or your contracting engineers *now*.

30 Rockefeller Plaza, New York 20, N. Y.



USE the Haulage BATTERY with these Cost-Cutting Advantages

These inherent construction and operating advantages are principal reasons why Edison Alkaline Batteries provide the closest approach to failure-free uninterrupted haulage power it is possible to obtain; give longer service life than other types of batteries; are so simple to maintain, and consequently, so economical to use. Because of their unequaled dependability and long, trouble-free life, alkaline batteries are helping users to keep down haulage costs. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.*

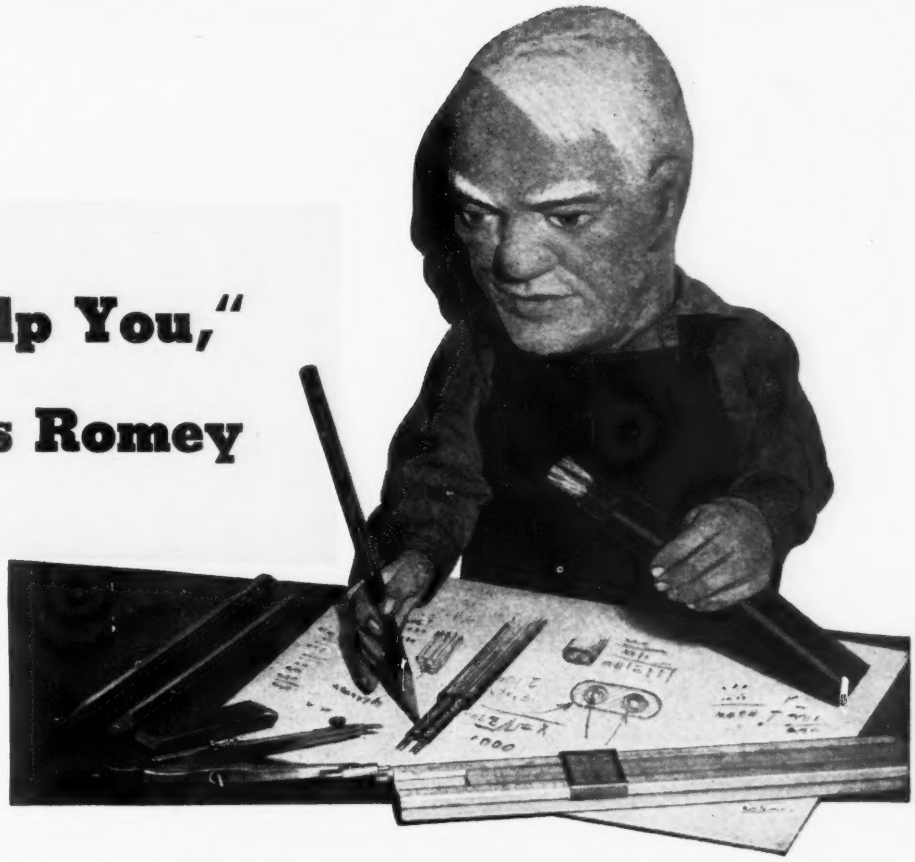
In Mine Locomotives and Shuttle Cars, Only Edison Alkaline Batteries Give You These Important Advantages:

- They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- They are **foolproof electrically;** are not injured by short circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.
- They are **simple and easy to maintain.**
- They can be **charged rapidly;** do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.
- They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling.
- They can **stand idle indefinitely** without injury, without attention, and without expense.

Edison

ALKALINE BATTERIES

"Let me help You," says Romey



Romey is a good man to know. He's the accumulated knowledge and skill of the men and women who make Rome Cable Products.

Throughout the period of the war Romey was constantly at work developing new insulating compounds and new products, and improving methods of making them.

This wartime experience enables him to handle your wire and cable needs even better than he's served you in the past.

Through his sales representatives . . . or direct to Rome Cable headquarters, he'll be glad to learn about your wire and cable problems, and he'll do his best to help you as he's helped so many others in various fields of the electrical industry.

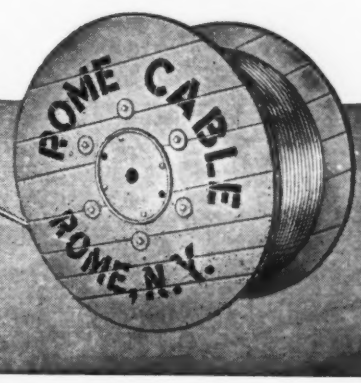
SALES OFFICES

NEW YORK, N.Y.
CHICAGO, ILL.
BOSTON OFFICE
Marshfield Hills, Mass.
CLEVELAND, OHIO
PITTSBURGH, PA.
WASHINGTON, D. C.
PHILADELPHIA, PA.
LOS ANGELES, CALIF.
DETROIT, MICH.
ROME, N.Y.

See Your Telephone Directory

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION
ROME • NEW YORK



SOUND SLEEP for the man who signs the order isn't included in the specifications . . . but it is a by-product of the best wire rope.

THE SAFETY of working personnel and the public is the soundest of operating economies. Rochester ropes, over-specification in every grade and size, are excellent insurance of accident prevention, and sound sleep for management.

TODAY . . . with war requirements satisfied, Rochester ropes of all types, sizes, grades and constructions, are again available for prompt shipment.

ROCHESTER *Ropes*

JAMAICA, NEW YORK • CULPEPER, VIRGINIA

Culpeper, Va., and Jamaica, N. Y., plants

RAINBOW STRAND ROCHESTER ROPES

Are *your* motors developing a Burnout schedule?

Sometimes, even the best designed motors burnout with a regularity that seems beyond control.

For example, a light-metal refining plant has had this experience with one-horsepower motors used to drive the centrifugal pumping system of the fusion pots. The motors were originally designed to run on metal tracks eighteen inches above the fuming surface of the molten metal. The motors were to run 3 minutes at 30-minute intervals.

But, to speed up production, operators left the motors on the tracks, above the fusion pots. So motors insulated with conventional materials burned out at about two-week intervals.

A motor was rewound with Fiberglas* Electrical Insulation and then *permanently* installed in the heat and fumes above the molten metal. The result has been *uninterrupted service*—now for more than a year—even though the motor is exposed to corrosive vapors and ambient temperatures in excess of 250°F.!

HIGH Safety-Factor INSULATION

That's how Fiberglas Electrical Insulation Materials, again and again, have proved their ability to protect motors from "3rd degree" burns—and from the other conditions that cause the majority of motor failures.

Fiberglas Electrical Insulation Materials, made of extremely fine fibers of glass, retain most of the characteristics commonly associated with glass. Being inorganic and noncombustible, they are unaffected by high temperatures. The individual glass fibers do not absorb moisture and will not swell or disintegrate or become chemically affected by oils, most corrosive vapors or acids. Fiberglas, therefore, retains its properties and provides a dependable base for impregnants under the most adverse conditions. Fiberglas Electrical Insulation furnishes a *Safety-Factor* that eliminates many causes of down time—with its consequent expense and production losses.

And remember, the only added cost in rewinding with Fiberglas is the slight difference in the cost of the insulating materials.

ASK FOR FIBERGLAS...IN YOUR NEXT NEW MOTOR...AND ON YOUR NEXT REWIND

FIBERGLAS

*T. M. Reg. U. S. Pat. Off.

ELECTRICAL INSULATION MATERIALS

THERE'S A COMPLETE LINE OF FIBERGLAS ELECTRICAL INSULATIONS
YARNS • TAPE • CORD • SLEEVING • CLOTH AND OTHER FORMS

Fiberglas is also available in Magnet Wire, Special Wires, Varnished Cloth and Tape, Mica Combinations, Laminates, Saturated Sleeving, Varnished Tubing, Pressure Sensitive Tapes—and Special Products.

Fiberglas-base Insulation Materials, in plain and treated forms, are available *now*. For complete information consult your distributor or write for the new Fiberglas catalog. *Owens-Corning Fiberglas Corporation, 1862 Nicholas Bldg., Toledo 1, Ohio.*
In Canada, Fiberglas Canada Ltd., Oshawa, Ontario.

FAIR weather or FOUL

YOU CAN COUNT ON YOUR INDUSTRIAL SUPPLY SPECIALIST

HE IS always prepared to serve your needs . . . to supply the right products to match your industrial problems and requirements . . . at the right price, at the right time.

When moving bulk materials is your problem, your Industrial Supply Specialist will recommend Hewitt conveyor belting. Three Job-Engineered brands—Monarch, Ajax, and Conservo—are available in all widths and plies to meet your requirements. Hewitt conveyor belt has been especially designed to resist abrasion, weather, mildew, and other factors that shorten the life of ordinary belting. Ask your Industrial Supply Specialist to show you how Hewitt Job-Engineered conveyor belting can carry more tons for less money.

•

Specify "Hewitt" for quality industrial rubber products. Phone the Hewitt distributor listed in the Classified Section of your telephone directory . . . or write Hewitt Rubber Corporation, 240 Kensington Avenue, Buffalo 5, New York.

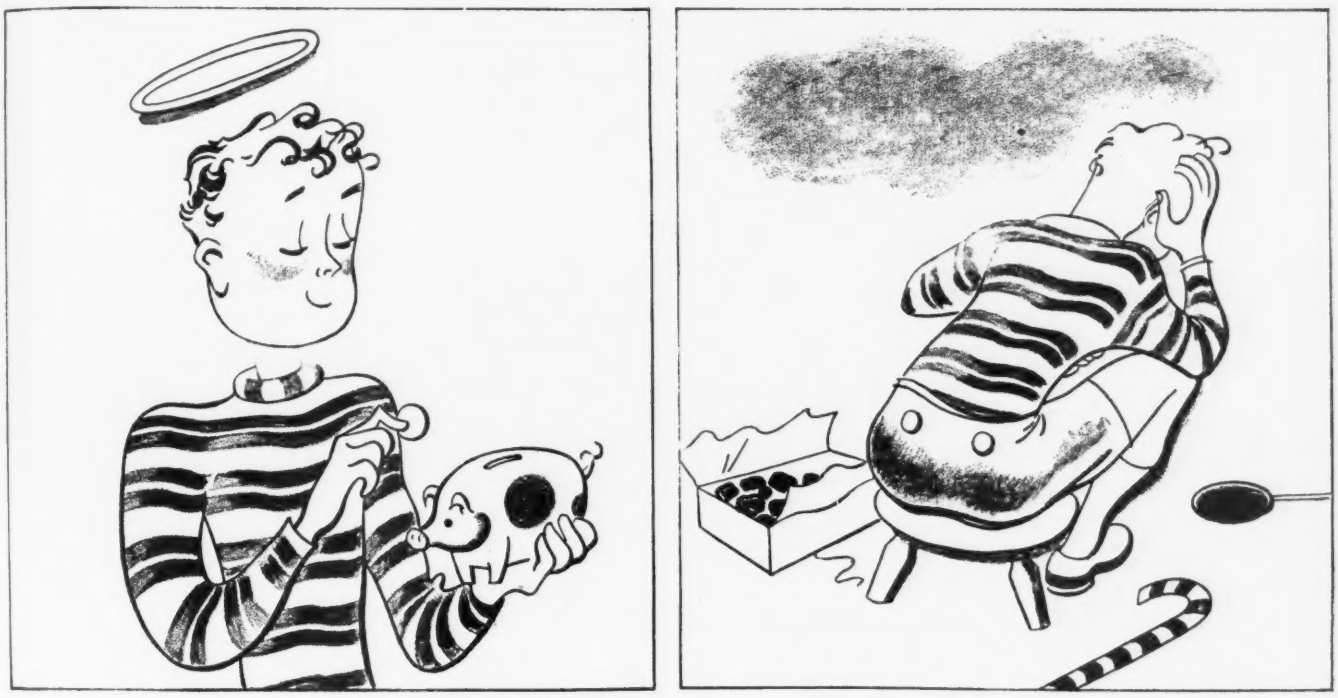
Quality Rubber Products for Industry for 85 Years

HEWITT RUBBER

of Buffalo

Job-Engineered Industrial Hose • Belts • Molded Goods

"It's Not So Hard To Save Money As It Is To Spend It Wisely"

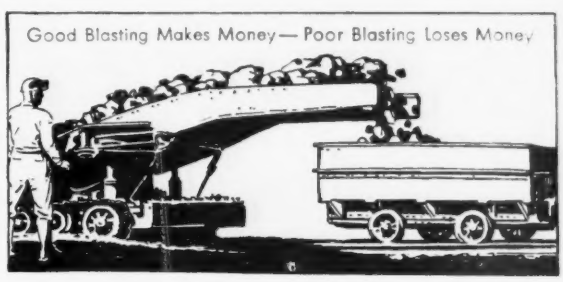


. . . advice that applies to blasting, too

Boy or man, it's not what you save that really matters, but what you get in return for your money. Saving on explosives is a case in point.

An explosive that gives you poor quality coal—that results in higher loader, transportation or crusher costs—*costs too much*, no matter how little you pay for it. On the other hand, an explosive that keeps loaders busy, cars full, men moving, gives you your money's worth right from the start.

Real thrift in blasting is a matter of using the right explosive in the right place, in the right amount. It does *not* necessarily involve the use of more explosives. It *does* take into account the whole cycle of operations. And that's where your Atlas Representative is ready to help you. He has 25 different permissibles at his command—years of experience on the best ways of using them. Let him help you produce *real* operating economies.



ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

How to make OLD TRUCKS LOOK NEW

• Here's a way to make old trucks look new—quick. Drive them to your International Truck Branch or Dealer and say, "I want an Appearance Reconditioning Job done on these fellows."

And you'll get it, because sheet metal and other materials that were out because of the war, are back. You'll get perfect fitting new International fenders, radiator grilles, hood sheets, doors, glass, hardware, headlights, bumpers, bumper guards and seat cushions—just what you want to put your trucks in shape.

Next, paint jobs if the trucks need them—new paint to clean-up and brighten-up the whole trucks, and cause people to say, "There's one operator who certainly keeps his trucks looking swell."

The cost? Not great. The result? Marvelous.

Act now. Truck production has increased, but it will take many years to meet the demand. Get your trucks "Appearance Reconditioned" by your International Truck Branch or Dealer. Make 'em good advertisements for you while you get additional economical miles from them.

Get These Too When You Get Your Trucks

"APPEARANCE RECONDITIONED"

• Hot Water Heaters and Defrosters • Seat Covers Elston Electric Road Sanders • Saf-T-Step • SOS Fire Guard • Whiz Automotive Chemicals • Spot Lights, Fog Lights and Driving Lights • Clearance Lights, Flags, Flares, Directional Signals and other Safety Devices.

All available from your International Truck Branch or Dealer

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL

INTERNATIONAL Trucks

How to Move MORE CUBIC YARDS

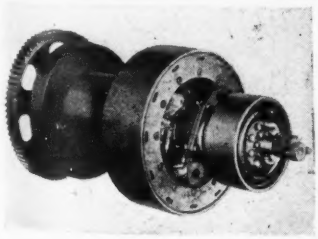
. . . at lower cost

Experience has proved that shovels, cranes, dredges and draglines equipped with Fawick Airflex Clutches give you new *full-time* operating efficiency.

1. These clutches absorb torque, shock and vibration, and transmit power through a cushion of air.
2. They have no arms, springs or levers to break, wear out or get out of adjustment.
3. They require no lubrication—maintenance costs are unusually low.
4. Their flexible cushioning action protects *both* motor and mechanism.

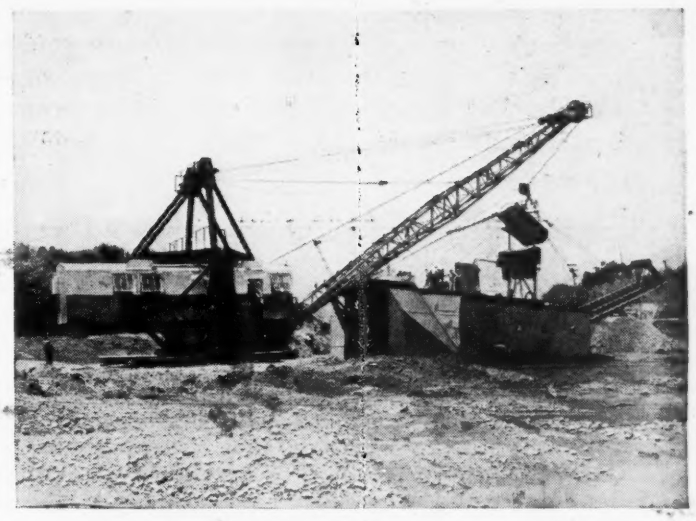
The RESULT—more hours of effective service—fewer breakdowns—more material moved—at lower cost per cubic yard.

Fawick Clutches are providing new efficiency for shovels, cranes, draglines and hoists.



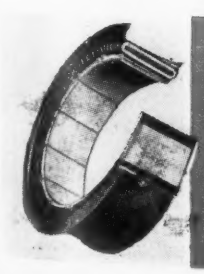
▲ Seven Fawick Clutches are used on the Byers ½ cu. yd. "Traveler."

◀ Hoist drum assembly of the shovel above — Fawick equipped.



Marion dragline, equipped with Fawick Swing Clutches.

Write us for complete data, and recommendations engineered to suit your equipment. Book on request.

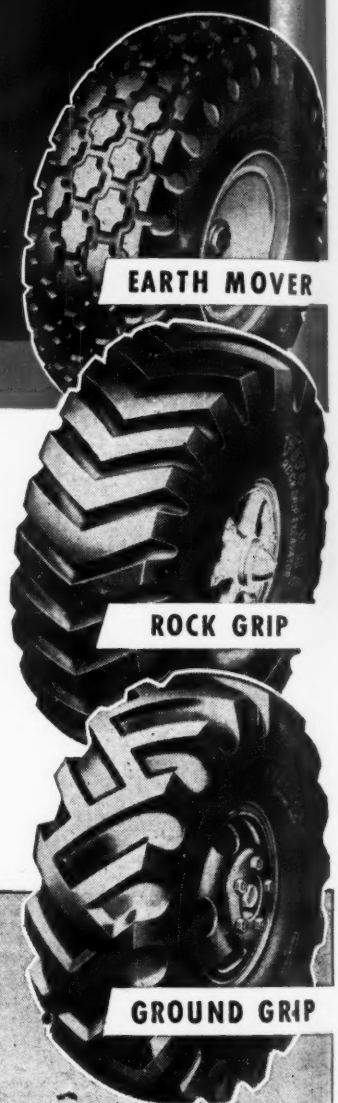


FAWICK *Airflex* CLUTCH

FAWICK AIRFLEX CO., INC. • 9919 Clinton Road, Cleveland 11, Ohio

In Canada, Dominion-Coventry, Ltd., Montreal, Toronto, Vancouver • In Britain, Crofts Engineers, Ltd., Bradford, England

Firestone TIRES-
Built for
TOUGH JOBS!



FIRESTONE Off-the-Highway tires are built to absorb the punishment of your toughest jobs. They're made to stay on the job longer with less time out for repairs.

Tread rubber on Firestone Off-the-Highway tires is tough... cut-resistant. Sidewalls are double-thick...a real protection against rutwear and snags. Four extra tread plies cushion and absorb impact blows. Cord bodies are made from the strongest rayon, Gum-Dipped for multiple strength.

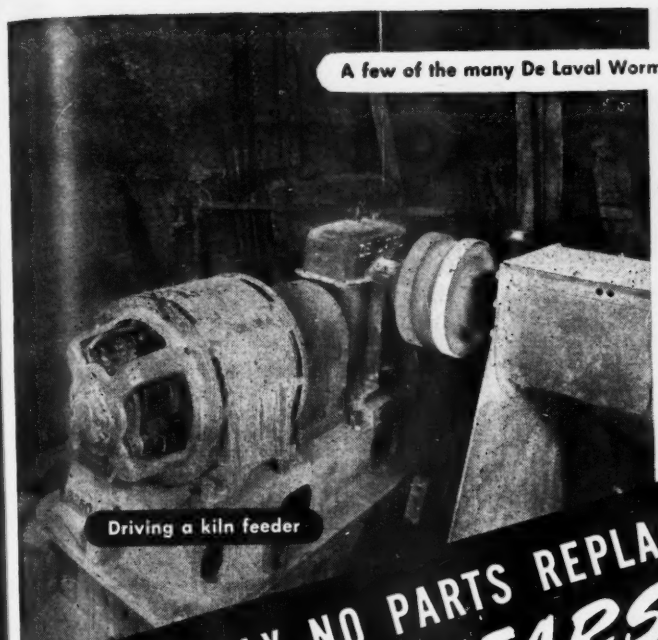
Put Firestone Off-the-Highway tires on your equipment. Then watch your records. They'll tell a story of lowered costs and rising profits... proof of a good investment.

Listen to the "Voice of Firestone" every Monday evening over NBC network.

Firestone
OFF-THE-HIGHWAY TIRES

Copyright, 1945, The Firestone Tire & Rubber Co.

A few of the many De Laval Worm Gear Reducers used in this plant



Driving a kiln feeder

Driving a kiln

PRACTICALLY NO PARTS REPLACEMENTS in 19 YEARS

Reported by Plant Employing Many De Laval Worm Gear Speed Reducers

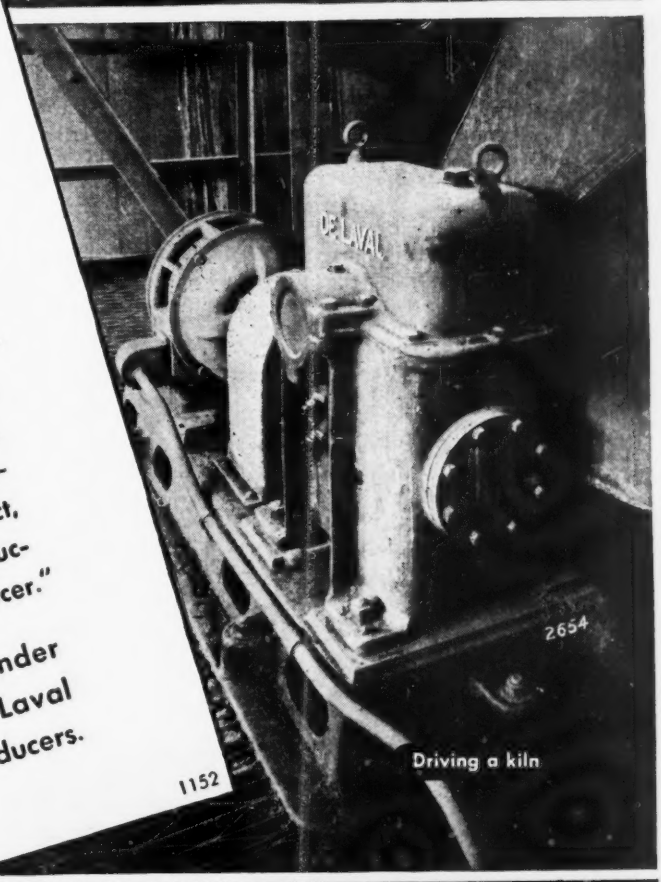
How's that for Reliability?

De Laval Worm Gear Speed Reducers have given such good service in a certain cement mill (name furnished on request) that the Plant Superintendent has written of their performance:

"There are about 175 reducers of various sizes in operation in this plant on a wide diversity of jobs; and during the last eighteen or nineteen years, since the original ones were installed, we have had to make practically no replacements of worms, wheels or bearings. In fact, there has never been any interruption in production by reason of the failure of a speed reducer."

For reliable, trouble-free service under severe conditions, specify De Laval Worm Gear Speed Reducers.

1152



Driving a kiln

TURBINES • HELICAL GEARS and WORM GEAR SPEED REDUCERS CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS and COMPRESSORS • IMO OIL PUMPS

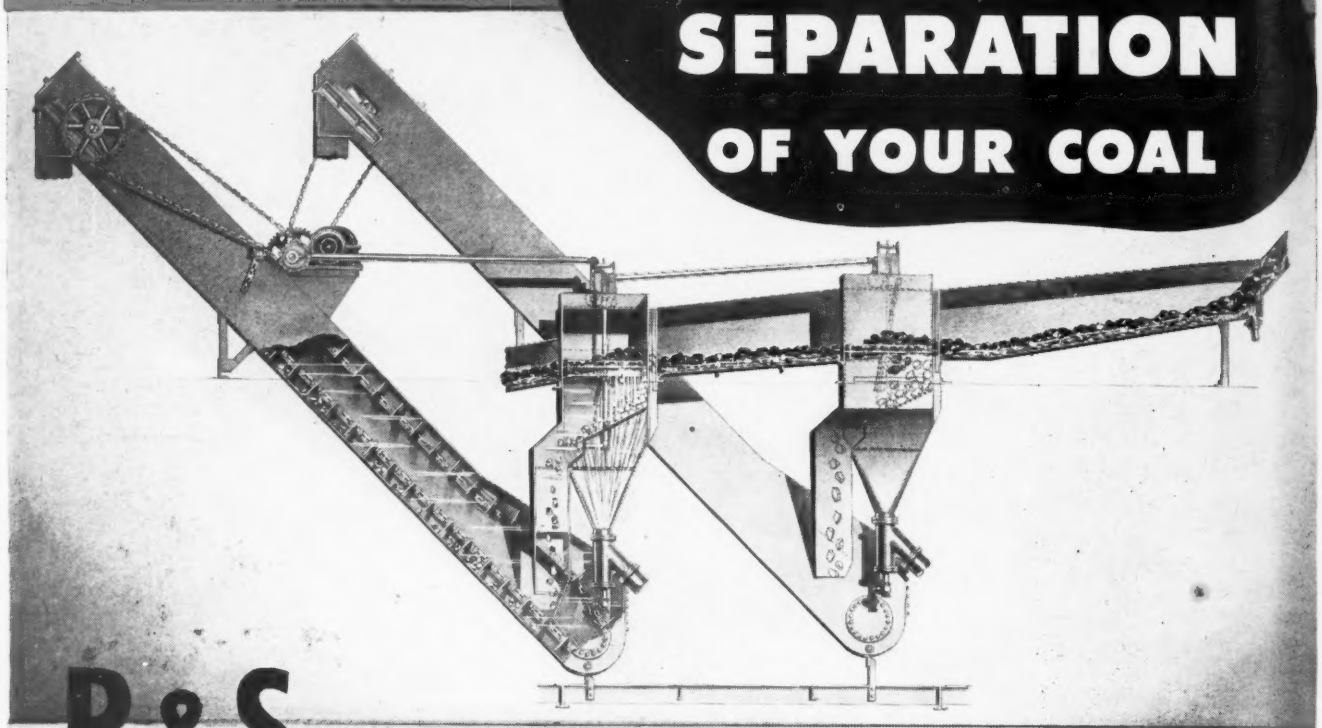
WORM GEAR DIVISION

DE LAVAL

STEAM TURBINE COMPANY · TRENTON 2, NEW JERSEY

SALES OFFICES ATLANTA • BOSTON • CHARLOTTE • CHICAGO • CLEVELAND • DENVER DETROIT • HELENA • HONOLULU • HOUSTON KANSAS CITY • LOS ANGELES • MANILA MONTREAL • NEW HAVEN • NEW ORLEANS NEW YORK • PHILADELPHIA • PITTSBURGH ROCHESTER • ST. PAUL • SALT LAKE CITY • SAN FRANCISCO • SEATTLE • TORONTO • TULSA VANCOUVER • WASHINGTON, D. C. • WINNIPEG And Cities in Central and South America

Continuous... Clean SEPARATION OF YOUR COAL

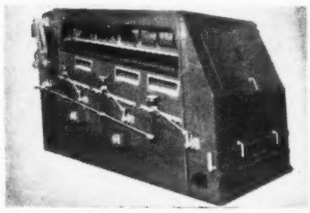


R&S TANDEM HYDRO-SEPARATOR

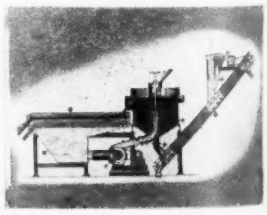
Windsor Power House Coal Co., Wellsburg, West Virginia, prepares coal for power plant use with R & S Hydro-Separators, pictured above. Mine run coal is crushed and screened. Large sizes are washed in Hydro-Separators. Small sizes are bypassed. Larger sizes are recrushed and mixed with the smaller sizes for delivery to power plant. The capacity of the Windsor plant is 450 tons of coal per hour.

R & S Tandem Hydro-Separators operate on a principle that assures automatic, fool-proof production of clean coal—a big statement that can be proved by many installations. R & S Hydro-Separators turn out a constant flow of uniform, high grade fuel. One operator controls the whole operation. Clean coal flows continuously through the Hydro-Separator cells with controlled water currents to effect the separation of refuse.

Write for bulletin No. 161 for full information.



Dry clean coal with air is efficient and economical in the R & S Stump Air Flow Cleaner. Ask for Bulletin No. 163.



R & S Hydrotators for fine coal washing are also automatic, efficient, and economical. Bulletin No. 162 gives a complete story.

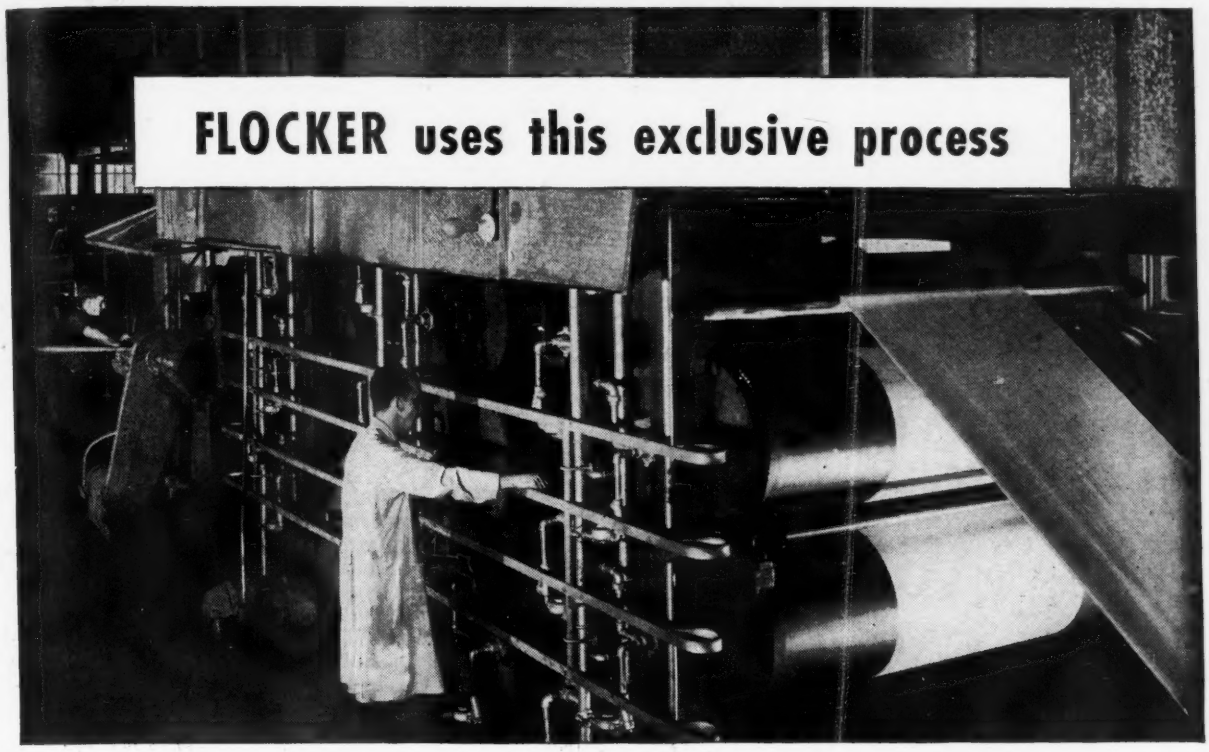
R AND S COMPANY

ROBERTS and SCHAEFER CO.

307 North Michigan Avenue, Chicago

2221 Oliver Building
PITTSBURGH, 21, PA.

P. O. Box 570
HUNTINGTON, W. VA.



FLOCKER uses this exclusive process

. . . to give you *better brattice cloth*

Flocker Moropa Brattice Cloth offers greater resistance to fire and mildew . . . stays clean longer and, under identical conditions, outwears the ordinary product.

This all-around superiority is achieved through an exclusive chemical process applied to either Jute or Cotton. The fabric is first saturated with special chemicals, then "can-dried"—a process adapted from the textile field—which thoroughly impregnates and bakes fire and mildew resisting properties into every fiber of the material.

And yet, in spite of its superior qualities, Flocker Moropa Jute Brattice Cloth costs you no more than ordinary Brattice Cloth . . . and prices are only slightly higher on Cotton. In reality, substantial savings can be realized on the use of either type.

If you're interested in the advantages this better Brattice Cloth affords, write for detailed information and quotations.

PROVED SUPERIORITY IN COTTON OR JUTE!

SUPERIOR FIRE-RESISTANCE—Protection lasts almost indefinitely, since chemicals are so thoroughly impregnated that they do not readily leach out.

SUPERIOR MILDEW REPELLENCE—Chemicals used do not absorb excessive moisture and fabric remains relatively dry and repellent to mildew.

STAYS CLEAN—Does not collect mildew "whiskers"—hence no slimy dirt.

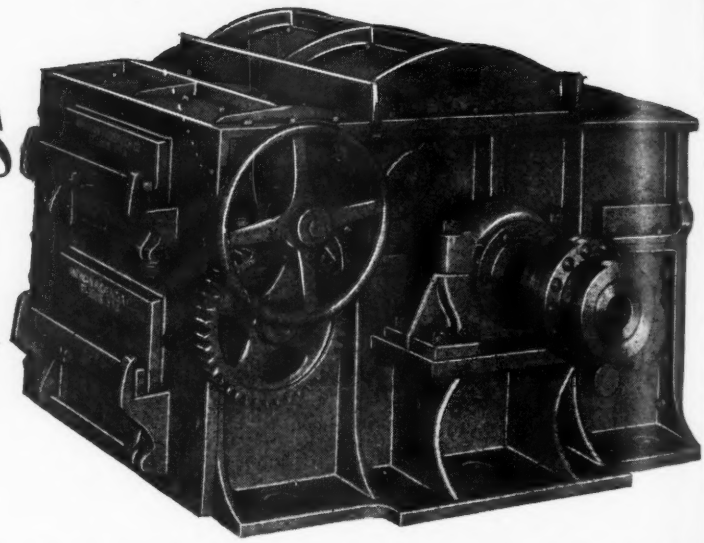
LONGER SERVICE—Can be used and reused over and over again. Absence of slime eliminates objections to recovery—men will co-operate in maintaining this Brattice Cloth which so vastly improves their working conditions.

JOHN FLOCKER AND COMPANY

644 GRANT STREET, PITTSBURGH 30, PA.

Since 1822, Ropes, Slings, Nets and Cordage Fittings, Tackles, Waxed and Unwaxed Linen . . . Specialists in Cordage Problems . . . Wire Rope

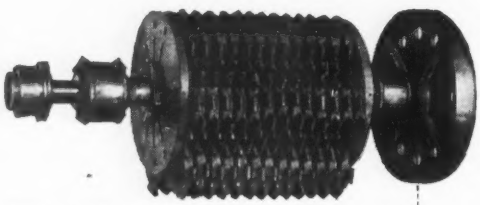
SLOWER SPEED plus MORE CUTTING EDGES *means* MORE-BETTER-CRUSHING TONNAGE



The efficient crushing action of American Rolling Ring Crushers is achieved through its many multiple cutting edges which drive at terrific force resulting from the use of *double* centrifugal action—the force of revolving rotor *plus* the force of the revolving shredder rings.

A hard or soft product, of varying moisture content, is reduced from ROM to stoker sizes with a *minimum of fines* and *no oversize*—with American's slow-speed *splitting* action. Capacities from 50 to 500 TPH.

Americans are custom-built by *makers of crushers exclusively*.

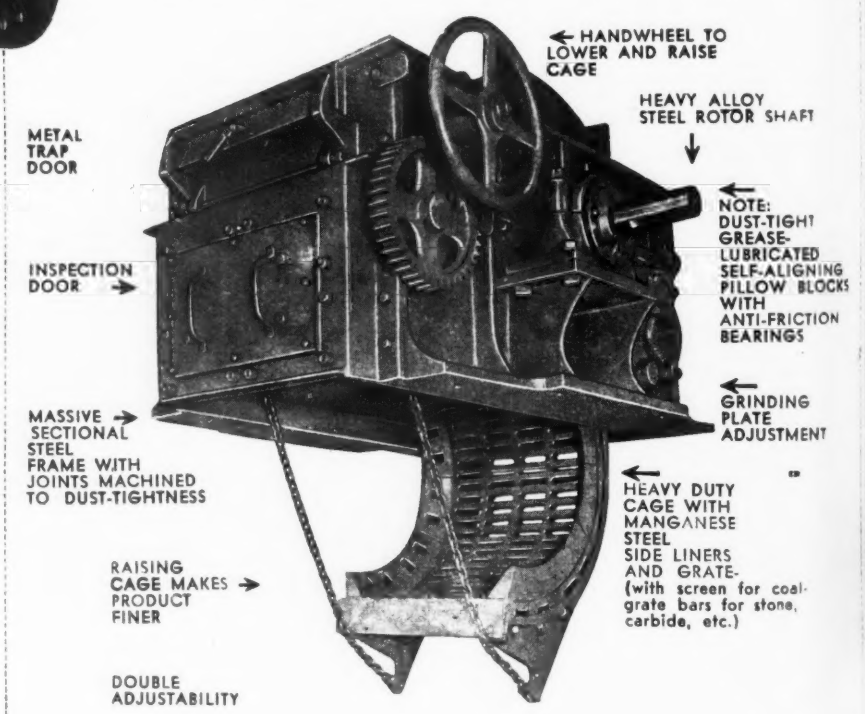


American's Heavy Manganese Rotor

ONLY AMERICANS HAVE SHREDDER RING ACTION

The many manganese shredder rings, each with 20 cutting edges, revolve free on their shafts at right angles to the rotor—at terrific, *doubled* centrifugal force. They split coal, instead of crushing it, to minimize fines.

The free revolving shredder rings deflect undamaged, when striking tramp metal. No shear pins or conventional safety devices are necessary.


← HANDWHEEL TO LOWER AND RAISE CAGE
HEAVY ALLOY STEEL ROTOR SHAFT
METAL TRAP DOOR
NOTE: DUST-TIGHT GREASE-LUBRICATED SELF-ALIGNING PILLOW BLOCKS WITH ANTI-FRICTION BEARINGS
INSPECTION DOOR →
← GRINDING PLATE ADJUSTMENT
MASSIVE → SECTIONAL STEEL FRAME WITH JOINTS MACHINED TO DUST-TIGHTNESS
← HEAVY DUTY CAGE WITH MANGANESE STEEL SIDE LINERS AND GRATE- (with screen for coal- grate bars for stone, carbide, etc.)
RAISING CAGE MAKES → PRODUCT FINER
DOUBLE ADJUSTABILITY

Write for "AC" Bulletin on Crushing Data

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1429 Macklind Ave.

St. Louis 10, Mo.

IN THE GROOVE . . .

Tiger Brand's Performance

MEANS *longer* ROPE LIFE

AMERICAN TIGER BRAND Excellay Wire Rope resists rotating in the groove. It runs true and smoothly over the sheaves . . . spools evenly on the drum . . . at all speeds . . . under light or heavy loads.

Made of strong, extra tough U·S·S Steel Wire, each strand of which is precision preformed to bear its proportionate share of stress, TIGER BRAND Excellay Preformed Wire Rope offers maximum resistance to abrasive wear and bending fatigue.

U·S·S American TIGER BRAND Excellay Wire Rope has the stamina to stand up under the severest kind of mining operation. It is engineered to increase the efficiency of all types of wire rope-rigged equipment. It can be installed speedily, easily. Requires shorter break-in period. Is safer to handle (crown wires lie flat and in place when broken).

These time, trouble and money-saving advantages of TIGER BRAND will serve you well. Keep in touch with your TIGER BRAND dealer.

AMERICAN STEEL & WIRE COMPANY
Cleveland · Chicago · New York

COLUMBIA STEEL COMPANY
San Francisco

United States Steel Export Company, New York

UNITED STATES STEEL

U·S·S AMERICAN

TIGER BRAND *Wire Rope*

"EMERSON'S MOUSE TRAP", All Over Again!

—the whole mining world is clamoring for S-D Automatic Mine Cars and S-D "Floater" Mine Car Wheels.

Atomic bombs and S-D automatic mine cars are making Knoxville famous.

The whole world . . . wherever coal is produced, is learning of the tremendous savings S-D 1-2-3 "Automatic" mine cars are making in coal mining. Result: many foreign corporations have requested contracts for building these famous cars. Two have been selected thus far, and licenses have been granted. First, the Hamilton Bridge Company of Hamilton, Ontario, Canada, for supplying Canadian mines and, second, to The United Steel Companies, Ltd., 17 Westbourne Road, Sheffield, England, for supplying mines in the British Isles. The United Steel Companies, Ltd. was chosen as licensee for Great Britain on the request of the British Ministry of Supply Mission.

Mine operators in these countries can now purchase locally the famous S-D Automatic Drop-Bottom Mine Cars and famous S-D Trucks, equipped with the S-D "Floater" Ball-Bearing Demountable Wheels.

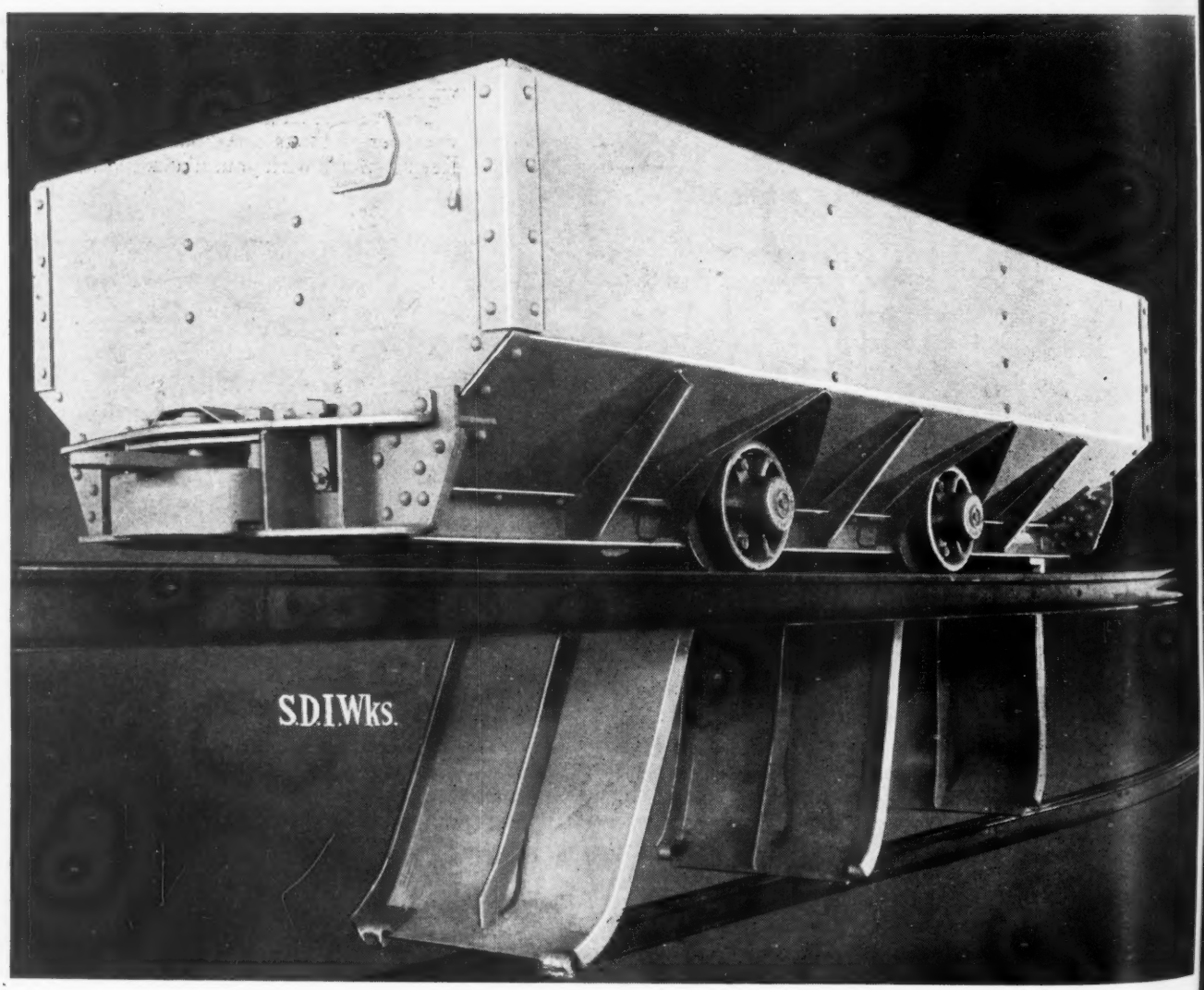
Ask the United States . . . more and more coal operators are changing over to S-D 1-2-3 Automatics.

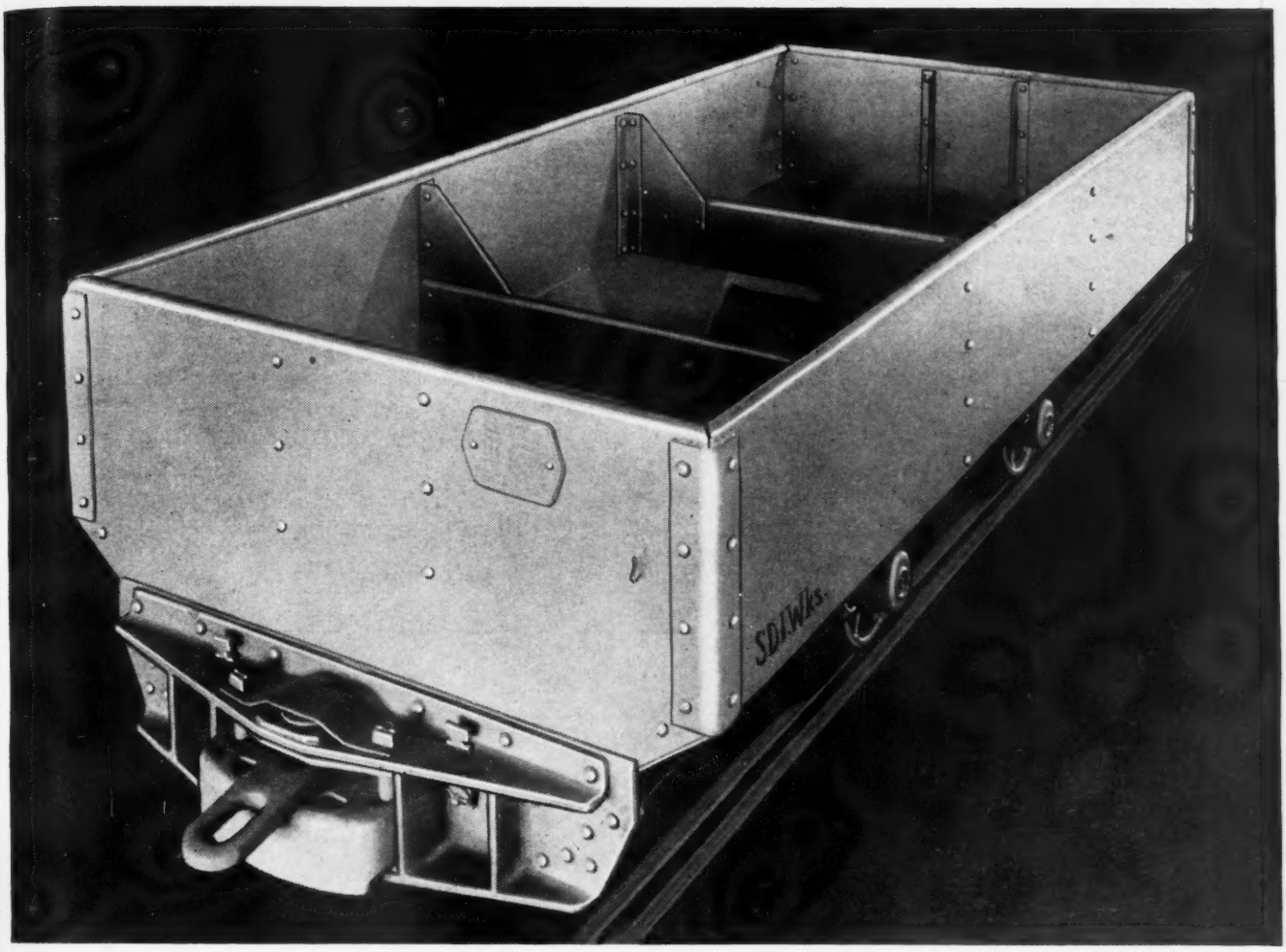
Here's what one big Ohio Operator has just done.

First—He changed over to S-D 1-2-3 Automatic mine cars.

Second—Increased output of loading machines 56½ per cent.

Third—He released 18 men for other work.





Fourth—The saving of labor alone, amounts to about $180.00 per day, or about $45,000.00 per year.

Fifth—The labor saving and increased output doubtless has reduced his cost of producing coal 40 to 50 cents per ton.

Sixth—Other savings include reduced coal breakage, lubricating of car wheels to once in ten years, increased haulage capacity of locomotive, practically no car repairs, etc., etc.

This recent record, just mentioned, merely confirms facts gotten from records of many, many coal companies which have hitherto changed over from old-fashioned rotary and end-dump cars to modern S-D 1-2-3 Automatics.

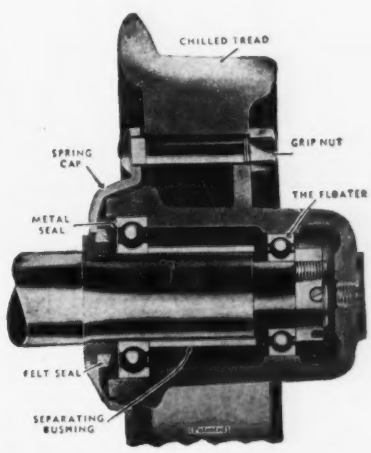
One big operator who recently installed about $140,000.00 worth of S-D Automatic equipment reports savings which will entirely pay for the purchase price of this equipment about once every five to six months. Surely, there possibilities interest you.

We can prove all these things to you if you want us to. Anyhow, write us a letter and we will get busy. We think we can make you a proposition you cannot afford to turn down.

How about paying us rent for the use of the cars, and paying a rent which is less than one-tenth per ton of coal handled by the cars than the savings per ton effected by the use of the cars.

Don't Sell The S-D "Floater" Wheel Short. Buy It And Stay With It For Long Range Profits.

The S-D "Floater" Ball Bearing wheel is, unquestionable, the easiest running mine car wheel available. Actual mine-operation tests have proved that "Floater" wheels permit great increases in net loads handled by locomotives, compared with wheels using other types of precision bearings. In addition, "Floaters" are guaranteed for 5 years to protect you against wheel and bearing breakage or undue wear and against unnecessary grease consumption. "Floaters" are truly a paying investment.



Sanford-Day Iron Works KNOXVILLE, TENNESSEE

WAR DEPARTMENT
OFFICE OF THE CHIEF OF ORDNANCE
WASHINGTON, D. C.

Oct. 16, 1945

TO INSURE PROMPT ATTENTION
IN REPLYING REFER TO:
NO. _____
ATTENTION OF

Mr. William Whaley, Pres. and Treas.
Myers-Whaley Company
Proctor Addition
Knoxville, Tennessee

Dear Mr. Whaley:

With the flag of unconditional surrender finally planted over Germany and Japan I want to thank you and the men and women of your plant for what they did in helping to win this great and total war. Through the combined efforts of our Armed Forces and American Industry we have shown the world a power unknown before in the history of the world. A vital part of this power has been our Industry-Ordnance team.

Your plant's great production of mechanism for 3" gun carriages, trainers, attachments and spare parts helped to save the lives of thousands of our men over seas. Furthermore, your production not only helped to give superiority of fire-power to our Armed Forces, but also it gave them an offensive spirit.

Through the efforts of Myers-Whaley Company you have helped us show the world how American labor and management can and does work together for freedom and justice. Your spirit of cooperation, a powerful weapon in itself, will, I know, help to lead our country to an even higher plane of life.

Sincerely,
LEVIN H. CAMPBELL, JR.
Lieutenant General, USA
Chief of Ordnance

This Is Your Letter Too!

We, of course, appreciate this letter and because you, our customer, played an important part in this war job, we are passing it along to you. For, without your patience and cooperative spirit as we tried to do our part in the war, in building mechanical loaders for essential coal production as well as items referred to above for the War Department, this letter might never have been written. We are glad that whether we make loading machines for you or gun mechanisms for Uncle Sam, we are able to do the job right.

Now that the long wait for Victory is over, our time and efforts are again devoted exclusively to building the famous Whaley "Automat" loading machines for the mining industry —

Wm Whaley —

MYERS WHALEY
•
KNOXVILLE TENNESSEE

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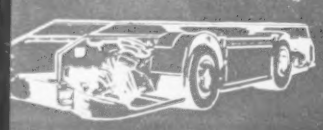
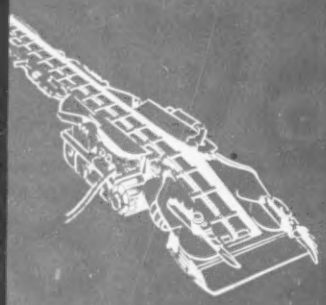
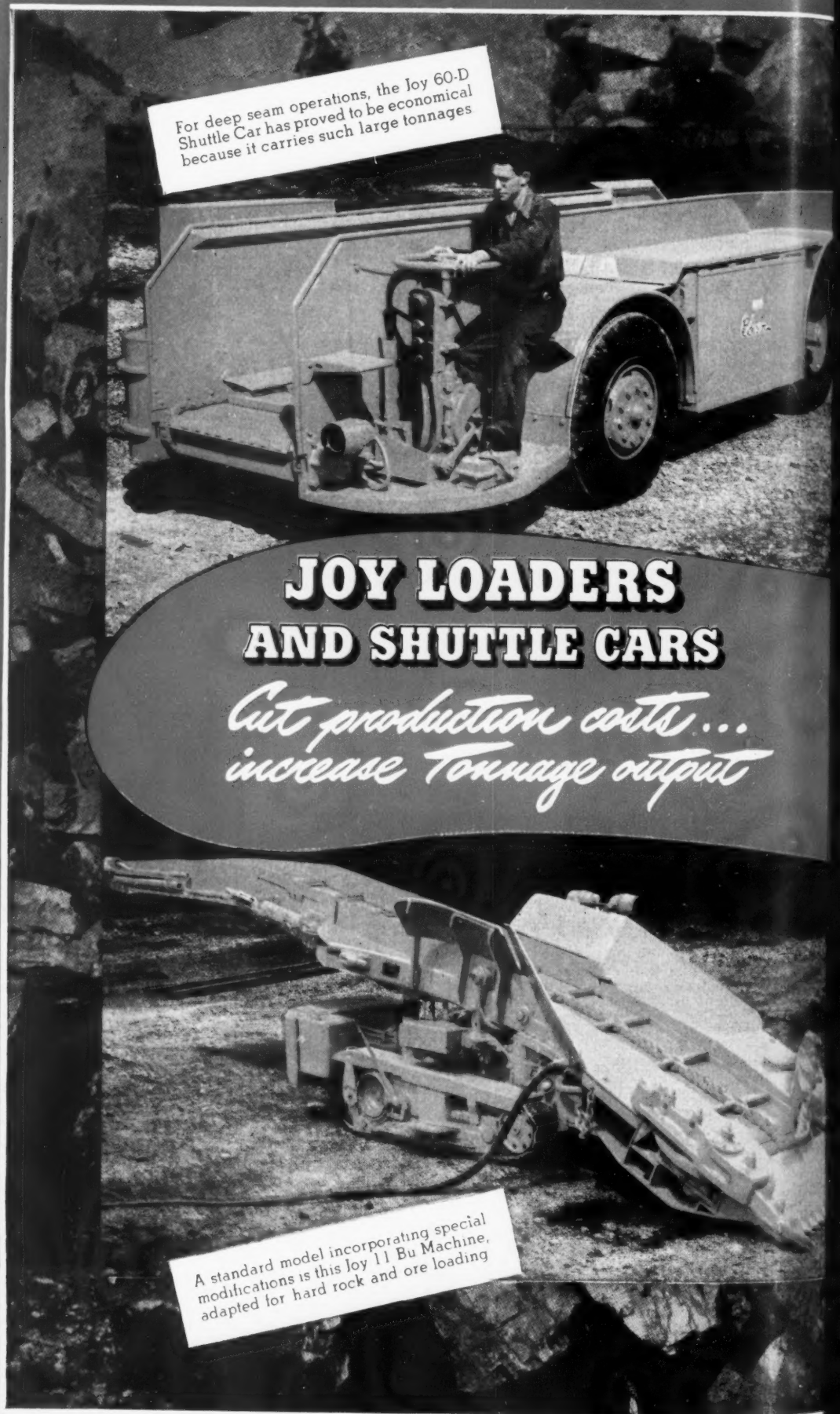
Joy builds all products for d



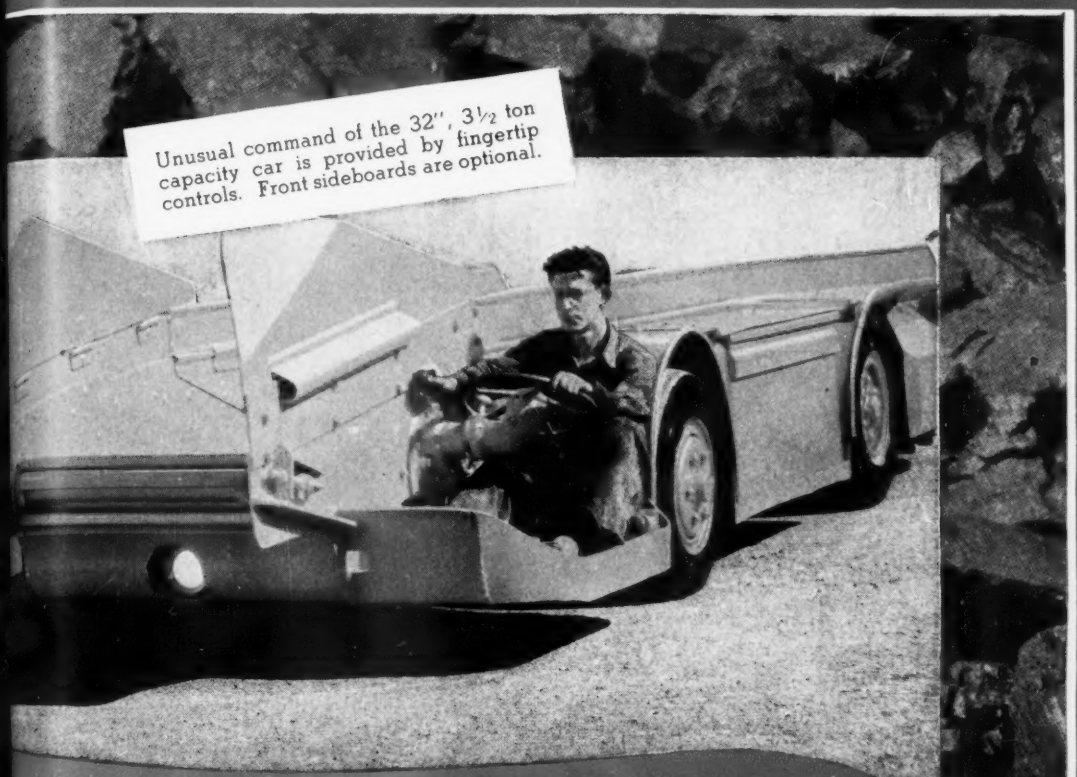


Call in a Joy Engineer

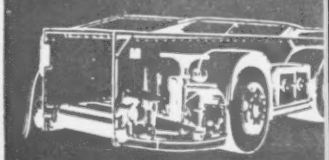

For deep seam operations, the Joy 60-D Shuttle Car has proved to be economical because it carries such large tonnages
JOY LOADERS
AND SHUTTLE CARS
Cut production costs...
increase Tonnage output
A standard model incorporating special modifications is this Joy 11 Bu Machine, adapted for hard rock and ore loading

where the job is tough, the

durability and operating ease



Unusual command of the 32", 3½ ton capacity car is provided by fingertip controls. Front sideboards are optional.



The speed and economy with which large tonnages are handled determines, to a great extent, whether you end up with red ink figures or black on your books. And because Joy equipment has a proved record of moving more tonnage at less cost per ton, it should be an integral part of your operations. The services of our mining engineers are at your disposal for consultation on problems . . . there's no obligation.

JOY MANUFACTURING CO.

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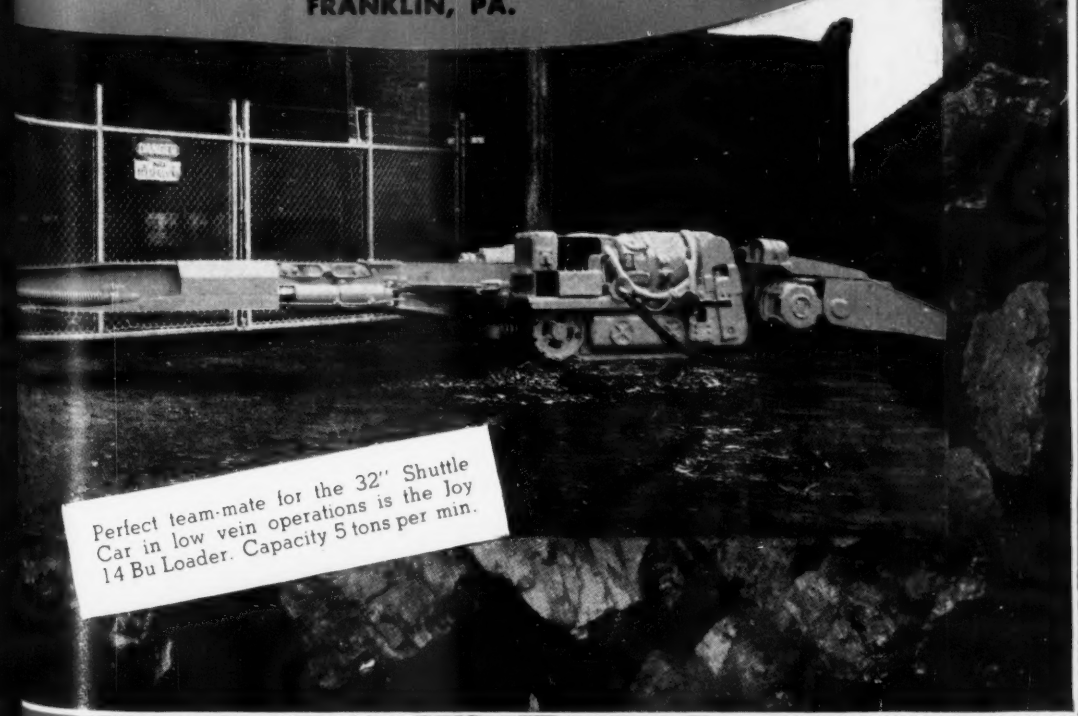
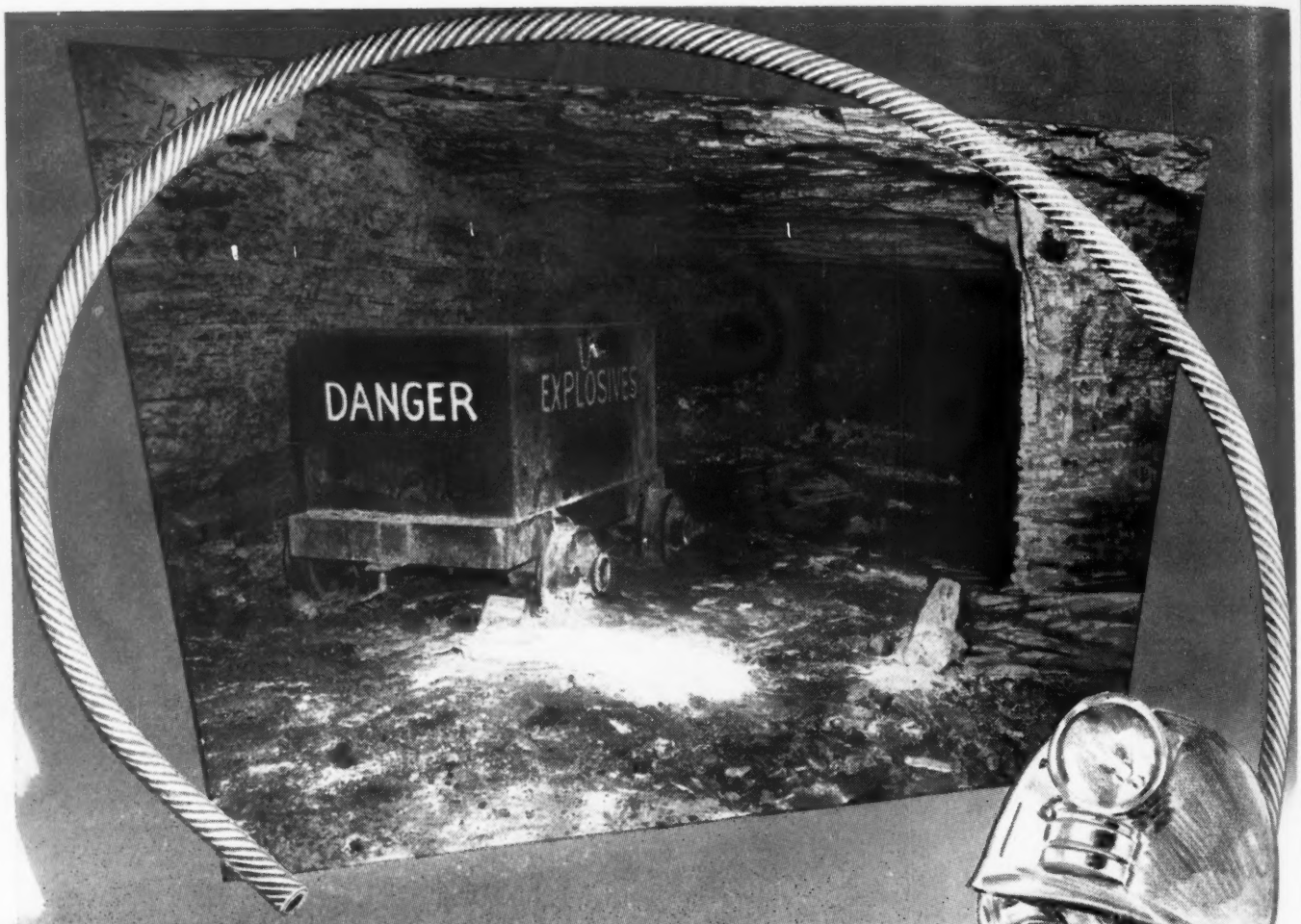


Perfect team-mate for the 32" Shuttle Car in low vein operations is the Joy 14 Bu Loader. Capacity 5 tons per min.

experts say "WORK WITH JOY"



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. . . And when using Ensign-Bickford Safety Fuse the number is 6 . . . . Six fundamental rules to follow wherever blasting is done . . . six simple rules that have been tested and proved safest and quickest.

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3. **Crimp** Safety Fuse firmly into the cap with a crimping tool.
4. **Center** Safety Fuse primer in the primer cartridge.
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ENSIGN-BICKFORD *Safety Fuse*

Coal Age

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Ivan A. Given, *Editor*

DECEMBER, 1945

Management First

MANY INDUSTRIES, manufacturing and otherwise, have set up wage-rate schedules or offered cash incentives to promote efficiency in operation. Now that the day-wage basis of payment is increasing in coal mining, similar plans are being suggested from time to time for that industry as well. The possibilities deserve study but there are two big questions: (1) Can they be applied with the desired success? and (2) Is the industry ready for them even if application difficulties could be ironed out? To take the second question first, there is considerable opinion that the answer is in the negative.

In contending that there is much to be done before coal mining should begin active application of incentive payments those who have studied the question point to management as the critical factor. Management, they say, has not yet reached the limit of what it should do itself in assisting men and equipment to produce more by maximum use of steps other than cash payments, such as more efficient equipment and methods, stimulation of the competitive spirit inherent in all men, and praise for real achievement.

The fact that better management really means something is reflected in the statements supporting applications for Coal Age "Coal-for-Victory" awards in both 1944 and 1945. In addition to offering "better management" itself as a reason for increases in efficiency, mining companies also cited many other things that are a part of good management in the broad sense. These include mechanical mining, improved methods, better supervision, stimulation of employee-management cooperation, and many others. All the evidence indicates that management still has a big opportunity. After that, cash incentives may be worth considering.

Burning Question

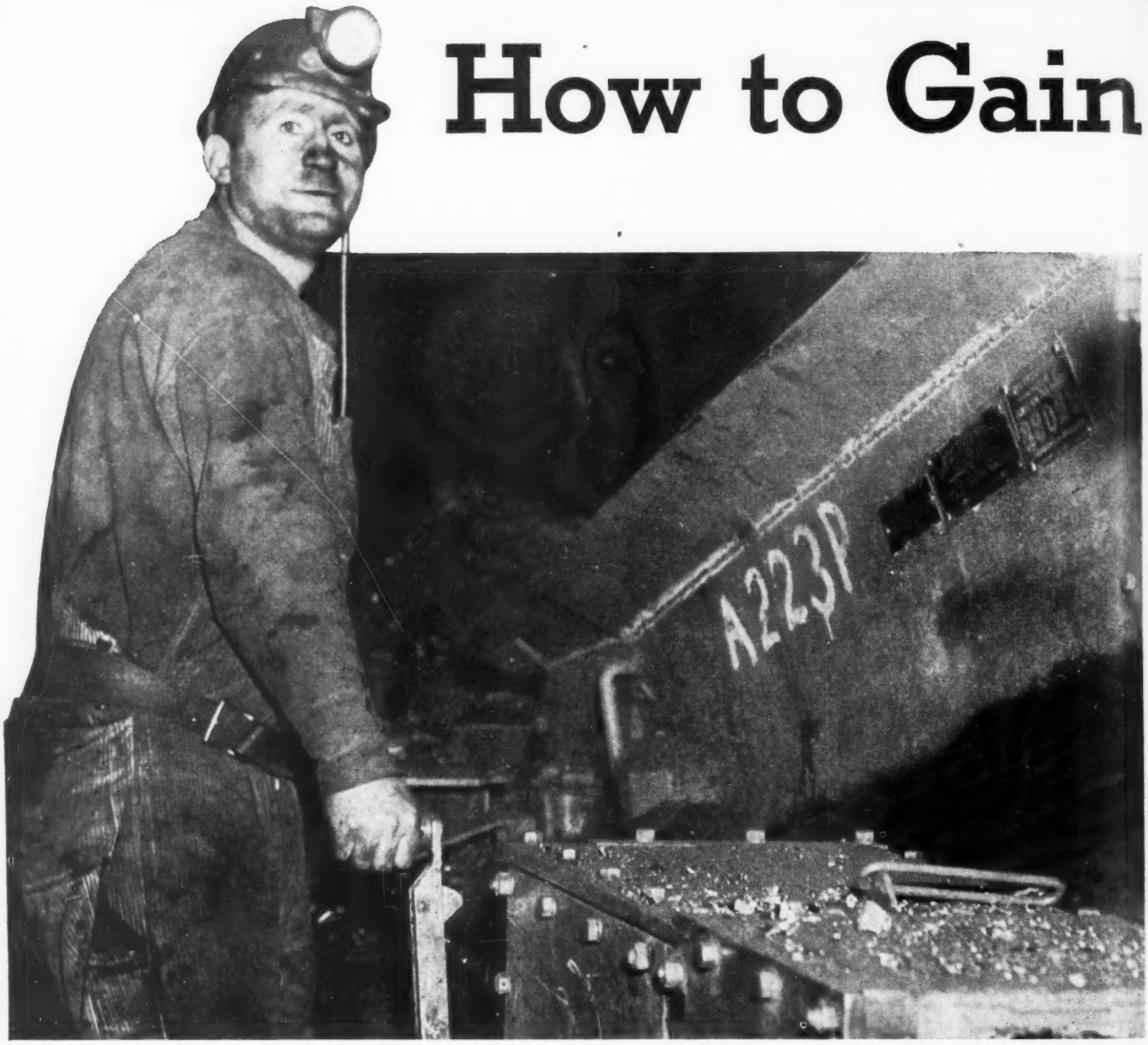
THE FACT that the public tends to consider coal and smoke as one and the same thing has given the industry considerable trouble in the past and promises even more in the future unless additional steps are taken to promote smokeless operation and inform the public as to the truth of smoke production. Among its other drawbacks, smoke makes a handy issue in running for political office even though other less-visible products of commerce and industry may be—and often are—more harmful to health and property. Agitation already under way may be expected to cost coal real tonnage in the absence of constructive action.

Considerable strides have been made in resolving the smoke problem so that coal's interests—and the interests of its customers and employees—are protected. However, the work so far can be regarded as only a start and the future will necessitate greatly increased emphasis on getting fair and reasonable smoke ordinances, installation and proper use of smokeless burning equipment and making the coal itself more smokeless by better preparation, briquetting, carbonization and the like or by converting it into a liquid or gaseous form. If greater convenience in use can be provided at the same time, a really powerful weapon against competition can be added to the merchandising arsenal.

Plus Values

INSTALLATION of mechanical-mining equipment in itself provides substantial benefits in lower cost, thereby heightening the industry's ability to keep prices to the consumer down, pay good wages and return a reasonable profit to investors. Any increases in the efficiency with which the equipment is operated after installation naturally increases the benefits. That, however, does not exhaust the possibilities. Substantial savings in other directions not ordinarily thought of also are possible. Higher efficiency through mechanical mining or in any other direction also reduces outlays for workmen's compensation, old-age and unemployment insurance and vacation payments. One estimate of the savings in these directions ranges from 9 to 14c. per ton and it is stated that "the saving has more than paid for the investment in mechanical equipment." Each added levy on the payroll therefore is an added incentive to mechanize where it is not already the case, boost the efficiency of existing equipment and facilities to the maximum and eliminate all possible injuries. Machinery and methods are the keys and they pay off not only directly but also indirectly.

How to Gain



THE MINER—Not only the man behind the machine but the critical factor in insuring maximum progress for coal mining. Understanding the way his mind works and giving him an opportunity to participate in plans for the advancement of the industry are cited by authorities as keys to his active cooperation

Key Factor: How the Miner Looks at Coal

By WHITING WILLIAMS

IT IS more important to know the characteristics and properties of persons than those of vegetables and minerals—Baltasar Gracian.

What kind of a chap is Steve, our typical coal miner? What's on his mind? And whatever it is, who or what put it there?

These questions must be answered before much can be expected from any effort to meet the challenge presented by that coal town where I spent a week just 25 years after I had lived and worked in it under an assumed name. There, as reported in *Coal Age* of November, 1944, I found the physical conditions of life and labor hugely improved but the *mental* conditions vastly worse—with the miners, especially their local leaders, unbelievably ignorant of their industry's problems and amazingly distrustful of their own and every other coal operator's honesty and good intentions.

To be sure, that first step of understanding Steve and the way his mind works is far from easy. Besides representing a half million or so individual employees (to say nothing of their wives and youngsters) Steve personifies the languages, cultures, traditions and viewpoints of different racial and national groups to the number of more than fifty, although today the number who, in spite of long residence here, found learning English a virtual waste of time, doubtless is smaller than some years ago. Still further, he lives and works under the most diverse conditions—everywhere from big cities

Miner Cooperation

Men and coal are synonymous. Active cooperation of the miner with management means faster progress for the industry. Getting that cooperation—and keeping it—is now one of coal's biggest problems. To help management find the answer, *Coal Age* presents herewith Whiting Williams' views as to the key factor—miner attitude—and its own summary of methods found effective in reaching the goal—more cooperation.

down to small towns, "patches" and farms, "enjoying" every imaginable degree of closeness and especially of remoteness. In addition, due mostly to that remoteness, there exists, without doubt, no group of workers so oblivious to, or so little known by, the country's general public.

Nevertheless, there is no escaping this surprising and significant fact: in spite of all their deep-down differences, Steve and all but a small percentage of his working colleagues across the country now pay dues into the same union treasury!

Pattern Set by Job

The reason is simple: they all earn their living in the same fashion. They all support themselves and their families by digging coal. This fact supplies a master key to understanding Steve and all his buddies. For him and for them (as for practically all the rest of us) their daily thinkings and feelings are vastly less the result of the books they read than of their *daily experience in their daily work.* Accordingly, the biggest denominator common to Steve and his half-million associates of every type of personality and of every imaginable variety of living conditions is to be found in their daily coal-mine job. As a matter of fact, this common denominator is so potent that the psychological distance that separates a coal miner in the German Ruhr from his fellow miners in Welsh Rhondda or our own Pennsylvania is, I have long believed, actually *less* than the distance that separates that same Pennsylvania miner from the ordinary coal user in Pittsburgh or Cleveland in the United States.

So, to make use of this master key to Steve's mind, let's jot down certain points about him that follow inevitably from the single fact that he earns his living by producing coal.

1. Steve's daily job makes him one of the most individualistic, most craft-conscious and most self-respecting of all wage earners.

Practically the entire public is certain that every coal miner prays every night for a job up in the sunshine. To my readers this fallacy is too familiar to call for argument. "Too dang much weather outside" is the reason most often given me by Steve. But there is another less obvious reason. "Nothin' to do there in the steel plant most of the time," one miner put it, "yet strict orders against sittin' down. Thirteen of us given a job that two could do easy. I was ashamed to kill time that way. So 'twas back to the mines for me —and for life, I reckon."

I have often heard a hand loader refuse his "super's" personal suggestion for some little improvement in his methods and get only the "super's" shoulder shrug. Yet in many factories such refusal would have caused immediate discharge or layoff. Even among the most radical of the miners in Rhondda Valley of Wales, the chances were always good that after they grew tired of discussing the speedy obliteration of capitalism they would start arguing and boasting as to which could drill the best "powder 'ole."

Believe it or not, I have seen more craft pride exhibited during a single day in a coal mine than during any week in a steel plant or ordinary factory!

2. No other group of wage earners, with the possible exception of railroaders, is so conscious—or so proud—of the importance of their industry as the foundation and cornerstone of all other industries. This, to be sure, may some as a surprise to some—perhaps many—close to and in the industry, but my observations lead me to accept it as true and to conclude that this feeling needs only direction to make it work for real cooperation in advancing the interests of coal mining.

This feeling, to be sure, is closely allied with that individual miner's pride in skill. But it is something different and additional. Even if mechanization is carelessly allowed to lessen seriously this ancient self-respect of the hand loader, it hardly will decrease the multitude of those colliers who will continue to claim that "Unless we get out their coal people shiver in their homes or go jobless when their factories close down for want of fuel." Thus in that same Rhondda Valley, hardly a worker in the pit or a citizen on the street but reminded the newcomer from America, back in 1920, that "'Twas an industrial war this—won back o' the lines in the factories that made the guns and the ammynition. So, you see, 'twas won by us miners as furnished those factories with their coal."

3. In no other great industry is the individual wage earner so conscious of how his own personal safety depends from day to day upon the thoughtfulness of every one of his work-companions.

"All the time," so one oldtimer once put it to me, "I'm figurin' just how to get down the most tonnage for the least effort. But all the time, too, I'm rememberin' that even though I take good care o' myself when the gas is comin' out o' the face some damn fool a mile or so down the entry may get careless and blow himself—*and me*—and all the rest of us—to Kingdom Come."

"In view of the recent disaster in the neighboring mine, where 40 of your

colleagues lost their lives," so ran the notice posted near the hoist for our daily reading in a North France pit, "The management prays its every employee to exert the utmost of care in the interest of the safety of all his fellow-workers." Every time I read it I always found myself half muttering "Believe me, they can count on my full cooperation."

4. In many—too many—mines this daily bond of dependence upon each other has been turned into those "hoops of steel" that are always forged in the heat of crisis and high emotion, when some big disaster calls forth the self-sacrifice, super-courage and teamwork of every member of the community. And those bonds are scarcely weakened by time. Even though the explosion had happened years before, almost everybody in a certain American coal town appeared anxious to repeat to me every last detail of the awful days and nights of suffering and especially of heroism that followed it.

5. Few great industries have suffered so much or so long from irregularity of operation. Almost everywhere in King Coal's domain, accordingly, that extraordinary feeling of mutual dependence and togetherness has been further intensified by the more familiar disaster of the past when for weeks and months the tipple's whistle announced all too seldom the joyous news of "work tomorrow"! For that failure was quite certain to bring discontent and demoralization not simply to a few but to the entire settlement.

Irregular work, as I have observed on British docks as well as in countless other places, tends always to make for an unsteady worker and citizen—one more difficult to get along with than his fellow-citizens who work regularly. The same can be said of any community whose every member experiences the same single misery at the same single time. And where, as in the mine town, this misery's cause was for many years the willingness of some competitor to cut his price by reducing his wages, the result was fairly sure to be a wide and deep unfriendliness to *all* coal employers. It has to be added, also, that whether the whistle's failure was caused by lack of orders or by a strike the discontent of those jobless weeks or months was too often turned into still deeper hatred of employers by the super-powers and the bad manners of the company police.

You don't believe that an understanding of these five results of Steve's experience on his daily job deserve serious attention? Well, take a look at the use made of them for getting Steve into one of the country's biggest nationwide union-shop organizations. Surely it is, to a considerable extent, because John Lewis understands Steve's pride both in coal craft and in the coal industry that he has always presented the union's cause as a holy crusade. Just as Churchill knew his Englishmen when he asked their "sweat, blood and tears," so John L. understood his miners when he proclaimed his "no backward step"! And it was his understanding of that pride and also that feeling of interdependence that has made him teach his followers to delight in informing all their fellow Americans these many years that "We are the shock troops of the Army of Labor. We fight and suffer to win and consolidate a forward position not simply for ourselves but on behalf of all other wage earners." Pretty surely, also, John has long had in mind that to obtain and retain the necessary unity amongst them he must bind them together in the thrill of battle by means of an occasional nationwide strike.

All this means, I believe, that to get Steve's confidence his employer must not rely on handing him some new "welfare" plan on the silver platter of paternalistic goodwill. If it is to be gratefully received, it must somehow constitute a compliment to Steve's self-respect as a member of his country's basic and most important industry. Best results are likely to follow when the new improvement requires some measure of his own effort and offers him some measure of personal participation.

WHITING WILLIAMS

Over 25 years' activity in the field of better labor relations qualifies Mr. Williams to discuss worker attitude and what it means to industry. He is no stranger to coal and coal mining, having worked in mines in Wales, France and Germany in addition to the United States. Recently, he returned to a United States operation to learn how worker attitude had changed, if any, and since has been surveying opinion over the field to check his findings. Thus, the opinions he expresses in the accompanying material bear the stamp of authority.

Still an Opportunity

Now that the union's local leaders claim that their contract covers so many phases of the mine's daily work, it may be thought that no area now remains in which management can hope to reach the pride of rank-and-file Steve. But to an outsider, at least, it looks as if the union's top leaders themselves are not so sure of this as is generally assumed. For if they were their *Journal* would hardly devote itself so zealously not to giving Steve information about the problems and the possibilities of his industry but instead to urging and reurging Steve to utmost confidence in himself and his buddies, along with the utmost distrust of his mine management. Pretty surely such urging on behalf of the "class battle" against the employer as the representative of the hated rich indicates that these top leaders do more worrying about their union's unity and togetherness than many managers believe.

Altogether, it is easy to believe that Steve's pride of coal would make him welcome a lot more understanding of his beloved industry even if given by his employer. Without doubt, also, if he were, for instance, to see more and more of his pals raised by local training courses to positions of responsibility and authority, such demonstration of cooperation would offset many of the printed diatribes against the hated "master class." The reason is that such demonstration would touch Steve where he really lives—on his coal-mine *job*.

There is another field not yet preempted by the "contract" and, therefore, open for stimulating Steve's pride, both in individual craftsmanship and in coal, by means of his participation —or, if not his, then of his wife's. This field is the coal town itself—the community and its daily above-ground doings. That employer was heading in the right direction when he gave to each of his settlement's streets a real name and to every house a real number. Other and bigger opportunities lie up that same street—especially now that so many of its homes are no longer company-owned.

"No," a mine-town pastor once explained to me, "my duties give me no contact whatever with the foreign-born here." Evidently he and his fellow townsmen seldom if ever came together in civic activities. "When," said a Red Cross worker more recently, "I proposed a town-wide committee for raising funds, to include representatives of all nationalities, I was told that this had never been done in that community and was quite impracticable."

Chances are, of course, that all such teamwork would be opposed—if not taken over—by the "contract's" spokesmen. But surely these keep themselves busy enough as guardians of their members' daily mine jobs without needing to represent them in all their above-ground activities and concerns as parents and citizens.

Closely related with the above suggestions are two other opportunities for Steve to increase his self respect as the result not of free silver-platter gifts but of his own effort and merit. One of these is more use of recognition and honor for work well done. Especially now that mechanization appears to disfavor the old tonnage pay, consideration can well be given to posting, in both tipple and town, each week's or month's production figures, thus putting each crew in competition either with other crews or with its own earlier record. Whenever a poor showing could properly be blamed upon faulty upkeep or other shortcoming beyond the crew's control, it's dollars to doughnuts that loud complaint—and all possible improvement—would be forthcoming quickly.

The company magazine—or the town or county newspaper—represents, of course, another means to this same and related end. Another opportunity to build town-wide unity is by a more thoughtful and more constructive use of those community crises—whether of employment or the more specific disasters of explosions or strikes—by which Steve and all his neighbors discover within themselves such individual resources and such capacities for teamwork as they had never suspected.

Experience the Key

These and other possibilities come to mind for meeting the challenge of Steve's unfriendly mind by using the key that recognizes the five "tumblers" supplied by Steve's experience as a miner of coal. They are not here discussed but only mentioned. This mention is made pertinent and timely by the fact that too many coal employers—like too many others elsewhere—have forgotten about Steve's mind because they have lost contact with Steve himself. That in turn is because they have allowed Steve's leaders to build a wall between manager and man. So these employers have forgotten that in no other industry is every rank-and-file Steve, for all his feeling of interdependence, so anxious as in coal to enjoy his self-respect and self-importance as *an individual.*

Now that the split atom may add one more to the growing list of competitors, the continuance of King Coal's imposing domain—and hence of Steve's enjoyment of his beloved way of life as one of its loyal citizens—can be said to depend upon management's ability to gain his friendly cooperation. That is enough to justify the mention of any and all possibilities in that direction. But what is even more important than such mention is this suggestion: "Don't try to think up out of your own head just how to get your Steve's good will until you first take a good, hard look at the way *his* head works."

Getting Cooperation: How Management Can Proceed

IF THERE is one thing that mining management agrees on it is that full cooperation of the miner is necessary to maximum industry progress in the future. Some of the difficulties in the way of getting it have been set out by Whiting Williams in the preceding material. These difficulties are considerable, but, as he points out, some phases of miner thinking and attitude toward the industry reinforce the conclusion that management already has something to start on in attempting to build greater confidence and more teamwork.

The critical factor, Mr. Williams emphasizes, is whether or not the miner himself is given a chance to play a part in attaining the highly desirable goal of full cooperation for mutual benefit. "We," rather than "I" and "You," is the key to teamwork, and within the framework of that philosophy there is ample opportunity for developing more cooperation without any sacrifice of efficiency by management. In fact, the fuller understanding growing out of working together is more likely to result in a strengthening of management by making clearer to all its vital role in creating the conditions that make good wages and working conditions, as well as a prosperous industry, possible.

Keeping always in mind that his participation, where possible, is a prime consideration, management seeking better cooperation from the miner can choose from a number of methods. Some can be employed only by management, some only by the miner and some—in fact, many—by both jointly.

Facts Management's Job

Facts lead to understanding and here is one task that falls largely to management, since it has the facts readily at hand. It is a safe bet that few miners ever see one of the mediums by which the company sets forth facts about itself, its plans and its prospects, viz: the report to stockholders. Whether the company should go that far or even farther cannot be stated definitely here. Much depends upon the relations already established. However, those who have pursued a course of telling employees regularly about company and industry outlook, plans, progress and achievements and what they mean in employment report in most cases a favorable reaction.

Although the miner is commonly thought of as being somewhat insulated from the general public there is no reason for believing that he is completely so or that his response to general public feeling will not increase. Creation of public respect for the company and the industry by getting over the facts consequently has been accepted as necessary by coal mining, and the general programs now being carried out are having their effect—perhaps not great as yet—on miner thinking and attitude. The more the general campaigns are supplemented by local programs the better will be the results that can be expected. Local newspapers and the radio may very well, therefore, be explored as supplements to letters, messages or bulletin boards and material in the employee newspaper or magazine.

As in many other mining activities, supervisors also have a major role in creating understanding, confidence and cooperation. To work effectively, of course, they also must have the facts and be trained in how to impart them to the men in their crews. The good supervisor, of course, knows his men intimately, is on good terms with them and consequently is able to foster that

other vital element in joint action: participation by the miner.

Physical conditions, equipment and methods, according to a substantial body of opinion, also play vital parts in promoting employee regard for employer, with consequent effect on the employee's tendency to ally himself more closely with the company and its fortunes. In other words, any man is more likely to feel better about his job and more inclined to pool his interests with an organization that he is convinced is alert, businesslike and going places.

Smartness Pays Off

Paint, order and smartness of appearance are just as effective in winning employee respect and confidence in mining as in manufacturing, storekeeping and gasoline selling. In attaining good housekeeping, there also is an opportunity for employee participation in suggesting and carrying out ideas for landscaping, flagpoles and memorials, advertising signs and messages and similar morale-building improvements. Simple but prominently displayed and lighted signs like "X Coal Co. miners produce nothing but the best!" may seem obvious but they nevertheless work powerfully, though quietly, in strengthening the tie between miner and management.

Where the company is responsible for housing and community facilities, condition, appearance and cooperation in improvements are even more important in promoting pride in being affiliated with a good outfit, with consequent increase in teamwork spirit. Better communities attract better men, and when these men are afforded an opportunity to help in improvements they are even more anxious to maintain their connection with them and with the company. The numerous new communities and improvement programs completed, under way or planned are evidence that they return real values to the company. To repeat, community operation and planning provide an opportunity for giving employees an interest in promoting progress by making it possible for them to suggest improvements and, in many cases, carry them out.

Natural desire to excel and to preserve gains achieved by better-than-average accomplishments are powerful forces—perhaps the most powerful—tending, if proper advantage is taken of them, to promote community of interest. This leads naturally to consideration of the effects of machines and methods and how they operate as an incentive to cooperation. First, like the telephone man who thought better of his company because it supplied him with "the best damn tools money can buy," it is logical for a miner to think better of a mining company that makes a policy of using "the best damn machines money can buy" and supplementing them with "the best methods the best damn engineers can think up." It has been done, but it is hard for a reasonable man to refuse to operate a good machine at as fast a pace as possible—and then think up ways of getting even more. This is especially true if he is shown that it means better working time and better earnings because it puts his company and his industry in a better marketing position.

Recognition Cements Bond

Here, again, is an opportunity for enlisting the active interest and participation of the miner. This is not to infer that management should abdicate—far from it—and in effect say: "You call the tune." But men might well be encouraged to offer suggestions as to better ways of doing things. Many companies find this so worth while as to warrant setting up boards of judges, which should include employees, and giving tangible awards for outstanding ideas. In any event, it seems logical that "contributions to the progress of the X Coal Co. and its employees" be the subject of personal congratulations, bulletin-board displays and spreads in the employee newspaper or magazine. All men like to feel that their efforts are appreciated and even if they do miss the mark, a little praise for trying also can supply a good opportunity for adroit needling as to how it can be done better in the future.

Recognition of achievement also utilizes to good advantage the competitive spirit. It makes a good crew want to do better and puts the others on their toes. Publicizing comparative performance, not only within the organization but in relation to others in the field, has been found a most effective method of promoting a feeling of community interest on the part of employees, especially when related to working time and earnings.

Teamwork also involves many other things that tend to make the miner conscious that his fortunes, after all, are those of the company and the industry, and vice versa. Public attitude, as already pointed out, is a factor. The coal company that was favored with a visit from the wife of a President undoubtedly has benefited—and its employees also—from the feeling that it must be something special to get such attention. Visits from the public or people in the public eye accomplish two things: a lift to the organization and a better understanding of coal mining and what it means to the na-

Ten Steps to a Stronger Bond Between Miner and Management

1. Make sure employee and his family participate in company and community affairs where possible and proper.

2. Give employees the facts about the position, plans and progress of the company and the industry and what they mean to him.

3. Build public good will and regard for the company and the industry in the region.

4. Give supervisors the facts, and train them in passing them on to employees and enlisting their cooperation.

5. Maintain plants and equipment in A-1 condition and enlist employee participation in continuing improvements.

6. Use modern equipment and methods and make it possible for employees to suggest and put into effect more efficient methods.

7. Make use of the competitive spirit and see that outstanding employee accomplishments are suitably recognized.

8. Provide the best in community facilities and give employees and their families an opportunity to suggest betterments and carry them out.

9. Make it possible for employees to get regular news of each other's activities and interests and of the plans and activities of the company.

10. Acquaint the public regularly with company and employee doings.

CEMENTING THE BOND—Recognition of outstanding achievement (these miners and their representatives are gathered together to receive the 1944 *Coal Age* "Coal-for-Victory" awards) is one of the more powerful incentives to more teamwork and a stronger tie between miner and management.

tion among the people generally. Encouragement of visits by the public need not, and should not, be solely a management prerogative. When miners can have the part they should have, they inevitably tend to identify themselves more closely with the progress of the operation in question.

Making arrangements for more public visits does not, of course, exhaust all the possibilities in promoting employee-management cooperation. Another one is keeping various employee organizations and activities in the public eye. Glee clubs, bands, choirs and choruses on the radio and elsewhere, athletic teams, first-aid and rescue teams and other groups aided by the company and appearing under the mine name help in this direction.

Within the community or mine organization itself, these same groups, plus clubs of long-time employees, with suitable emblems presented by the company; debating societies, play groups, civic-improvement associations, Boy and Girl Scout troops, reading circles and many other similar organizations can, with management help, play a major part in developing a more cooperative spirit—always provided the employee (and his family) have an opportunity to play a leading role. In fact, an outstanding advantage is that such activities provide a part for the miner's wife and children. With a voice in community affairs they consequently have a greater interest in retaining their affiliation with that community and the company that makes it possible. Employee-relations experts are unanimous in saying "Don't forget the wife and kiddies!"

The fact that employee publications are an especially effective medium is reflected in the growing number now rendering a service. Since, if such publications are to be most effective, they must devote a large share of their attention to the miners, their families and their doings, company opinion must not dominate and newsgathering and preparation should be largely delegated to employees or members of their families, especially those known to exert the greatest influence. There is no reason, however, why such publications cannot be used directly or indirectly to acquaint miners, their families and the public in the region with company plans, prospects and ideas and what they mean in terms of employment and earnings. Fairness and no high pressuring are the keynotes.

News Builds Interest

Independent publications, principally newspapers, and the radio also are means of presenting facts that will build public and employee good will. It seems likely that the possibilities in these directions are yet to be fully explored by most mining companies. A little research will show the existence of a great deal of news about employees and the company that newspapers and local radio stations would welcome. Incidentally, some company-sponsored radio programs of a news character or utilizing employee talent are reported to be yielding excellent results.

All of the preceding, and other steps that might be taken, seem to add up to quite a program. However, coal companies have their choice of the methods that would yield best results under their conditions, while some of the things should be done as a part of the regular production operation. The question then is: "Is the effort likely to yield results that will make it worth while?" Of course, a hard-and-fast answer is difficult but the opinion of those most experienced in this type of work is in the affirmative.

More direct evidence of the benefits of cooperation were an outstanding byproduct of the *Coal Age* "Coal-for-Victory" award program. A substantial number of those filing entries, particularly for the awards given for increases in efficiency, cited more cooperation by employees as a major factor in their records. One manager, in reporting an increase of 9.6 percent in output per man-shift, had this to say:

"We convinced our men of the importance of their jobs to the war effort to such an extent that they were able and willing, in a lot of cases where absenteeism made it necessary, to double up and do two or three men's jobs. My desire to see this type of patriotism and loyalty recognized is the reason for sending in this entry."

Another operator had this to say:

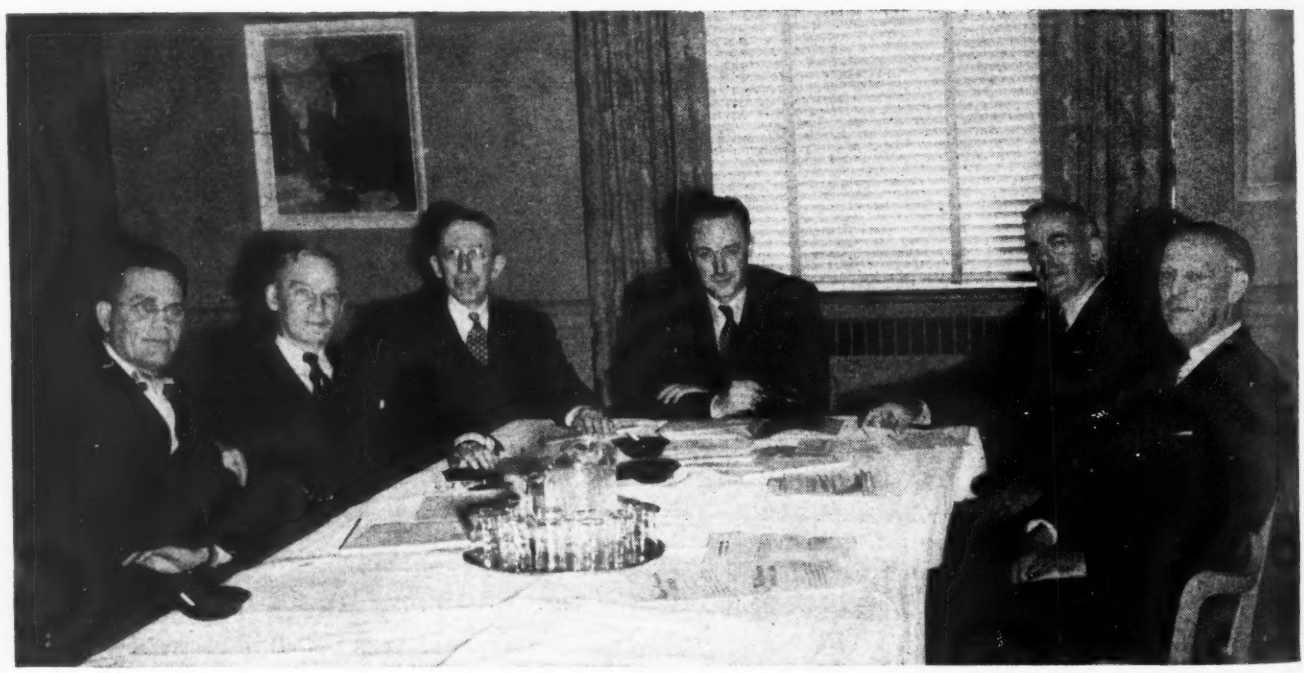
"Being one of the 116 coal-producing companies to be honored with the 1944 'Coal-for-Victory' awards renewed the enthusiasm and zeal of each individual in our organization to the extent that we are again eligible to file an official entry for the 1945 awards."

These and other expressions of opinion indicate that the game is worth the candle.

50 MINES WIN

1945 "COAL-FOR-VICTORY" AWARDS

Better Management, Better Supervision, Increased Use of Modern Equipment and Methods and Better Cooperation Between Employer and Employee Bring 1945 Awards to Men and Officials at 50 Mines



Experts judge the awards for 1945. From left to right, the line-up at the meeting in Washington Nov. 2 was as follows: Prof. Harold L. Walker, Carl Scholz, R. Y. Williams, Ivan A. Given, editor of Coal Age, who acted as secretary; Dean Edward Steidle and Dr. R. R. Sayers.

OUTSTANDING service to the nation in bringing its war effort to a successful conclusion won 1945 "Coal-for-Victory" awards for the managements and men of an even 50 coal-mining operations throughout the country in the judging held at Washington, D. C., Nov. 2. Designed to stimulate production for war purposes, foster mining progress and honor extraordinary accomplishment, these awards were offered by *Coal Age* with the support and cooperation of the Solid Fuels Administration for War to mark production achievements in 1945 equal to or better than in 1944, as well as efficiency increases of 5 percent or more in tons per man-shift.

Since the war happily ended before the end of the year and since the awards were primarily for war purposes, they were terminated as of the date of the Japanese surrender and companies were invited to qualify their operations for the periods Jan. 1-Aug. 1 or Jan. 1-Aug. 15, 1945 and 1944. *Coal Age* is now working out the basis for permanent annual awards designed to recognize outstanding achievements in promoting efficiency and expects

WINNERS OF BOTH "WAR-PRODUCTION EFFICIENCY" AND "VICTORY-PRODUCTION" AWARDS

COLORADO

Bear Coal Co.:
*Bear Mine, Somerset, Colo.
The Minnequa Fuel Co.:
*Morning Glory Mine, Walsenburg, Colo.
Oliver Coal Co.:
*Oliver Mine, Somerset, Colo.

ILLINOIS

The United Electric Coal Cos.:
Fidelity No. 11 Mine, DuQuoin, Ill.

KENTUCKY

Consolidation Coal Co.:
*Mine 214, McRoberts, Ky.

MONTANA

Northwestern Improvement Co. and Foley Bros, Inc.:
Rosebud Mine, Colstrip, Mont.

OHIO

Hanna Coal Co.:
*Dun Glen No. 11 Mine, Dun Glen, Ohio
*Georgetown No. 12 Mine, Adena, Ohio

OKLAHOMA

Sooner Coal Mining Co.:
Sooner Mine, Oolagah, Okla.

PENNSYLVANIA

Pittsburgh Coal Co.:
*Lindley Mine, Canonsburg, Pa.
Reitz Coal Co.:
*Reitz No. 5 Mine, Scalp Level, Pa.
Weirton Coal Co.:
*Isabella Mine, Isabella, Pa.
Westmoreland Mining Co.:
*Watson Mine, Mooween, Pa.

WEST VIRGINIA

Carbon Fuel Co.:
Mine No. 3, Carbon, W. Va.
Mine No. 5, Jochin, W. Va.
Island Creek Coal Co.:
Island Creek No. 1 Mine, Holden, W. Va.
Island Creek No. 15-A Mine, Holden, W. Va.
The Lorado Coal Mining Co.:
Lorado Mine No. 1, Lorado, W. Va.
Marmet Coal Co.:
*Cedar Grove No. 1 Mine, Hernshaw, W. Va.
Pursglove Coal Mining Co.:
Pursglove No. 15 Mine, Pursglove, W. Va.

WYOMING

Sheridan-Wyoming Coal Co., Inc.:
Miller Mine, Kirby, Wyo.
*Monarch Mine, Monarch, Wyo.
The Union Pacific Coal Co.:
Stansbury Mine, Stansbury, Wyo.

WINNERS OF "WAR-PRODUCTION-EFFICIENCY" AWARDS

KENTUCKY

Peerless Darby Coal Co.:
*Darby Mine, Splint, Ky.

PENNSYLVANIA

Rochester & Pittsburgh Coal Co.:
Helvetia Mine, Helvetia, Pa.
Westmoreland Mining Co.:
*Roaring Run Mine, Apollo, Pa.

VIRGINIA

Great Valley Anthracite Coal Corp.:
Great Valley Mine, McCoy, Va.
Stonega Coke & Coal Co.:
*Derby No. 1 Mine, Derby, Va.
Roda No. 5 Mine, Roda, Va.

WEST VIRGINIA

The Lorado Coal Mining Co.:
*Lorado Mine No. 2, Lorado, W. Va.
Marianna Smokeless Coal Co.:
Marianna Mine No. 1, Marianna, W. Va.
Marianna Mine No. 2, Marianna, W. Va.
Pardee & Curtin Lumber Co.:
*Bergoo Mine No. 3, Bergoo, W. Va.
Pond Creek Pocahontas Co.:
Mine No. 3, Bartley, W. Va.
Pursglove Coal Mining Co.:
Pursglove No. 2 Mine, Pursglove, W. Va.

WINNERS OF "VICTORY-PRODUCTION" AWARDS

WYOMING

The Union Pacific Coal Co.:
Winton Mine, Winton, Wyo.

KENTUCKY

Elcomb Coal Co.:
Elcomb Mine, Harlan, Ky.
The Elk Horn Coal Corp.:
*Elk Horn No. 6 mine, Jackhorn, Ky.
Homestead Coal Co.:
Homestead Mine, Earlington, Ky.
Sentry Coal Mining Co.:
*Sentry Mine, Madisonville, Ky.
Smith & Stokes Mining Co.:
*Blue Valley Mine, Madisonville, Ky.

OKLAHOMA

Seneca Coal & Coke Co.:
No. 4 Mine, Catoosa, Okla.

PENNSYLVANIA

Greensburg-Connellsville Coal & Coke Co.:
Francis Mine, Burgettstown, Pa.

UTAH

Nyman Coal Co.:
*National Mine, National, Utah

WEST VIRGINIA

Elk River Coal & Lumber Co.:
Rich Run Mine, Rich Run, W. Va.
Island Creek Coal Co.:
Island Creek No. 16 Mine, Holden, W. Va.
Pond Creek Pocahontas Co.:
*Mine No. 1, Bartley, W. Va.
Ruthbell Coal Co.:
*Deep Hollow Mine, Kingwood, W. Va.
West Virginia Coal & Transportation Co.:
*Jeanne Anne Mine, West Columbia, W. Va.

WYOMING

The Union Pacific Coal Co.:
D. O. Clark Mine, Superior, Wyo.

**Indicates winner of 1944 award or awards as well as 1945*

Efficiency Foundations

Better management, more mechanization, better supervision and more cooperation between company and employees again showed up as the major factors in tonnage and efficiency increases at mines receiving 1945 "Coal-for-Victory" awards offered by Coal Age with the support and cooperation of the Solid Fuels Administration for War. More than half the winners cited these as major influences in the results achieved. In approximate order of number of times mentioned, these and other factors underlying the records of the award winners are:

- Better management.
- Complete or additional mechanization.
- Concentrated and better supervision.
- Closer employer-employee relations, better cooperation.
- Better planning and engineering of working sections, better mining methods, concentration of workings.
- More and better training of men and supervisors.
- Improved cycle of operations.
- Improved haulage.
- Better maintenance.
- Safer operation.
- Additional plant and equipment.
- Improved supply handling and distribution.
- Better face preparation.
- Better surface preparation.
- More men, more working places.
- Better natural conditions.

to announce them early in next year.

Twenty-three of the 50 mines were double winners in the 1945 competition, receiving both the "War Production Efficiency" and "Victory Production" awards. The efficiency award, honoring "outstanding contribution to the national war effort in the form of increased productive efficiency in 1945 above and beyond the average for the industry, thereby materially advancing the cause of victory for the United States and its Allies," went to 13 additional mines. Fourteen other mines entered for and received production awards honoring "outstanding contribution to the national war effort in the form of coal production in 1945 equal to or bevond the national goal."

In all, the 50 mines earned a total of 73 awards. The judges were compelled to deny awards in one instance and one entry was withdrawn before the judging took place. As in 1944, the board of judges comprised the following:

Dr. R. R. Sayers, director, U. S. Bureau of Mines, Washington, D. C.

Edward Steidle, dean, School of Mineral Industries, Pennsylvania State College, State College, Pa.

Carl Scholz, consulting engineer, Charleston, W. Va.

Prof. Harold L. Walker, head, Department of Mining and Metallurgical Engineering, University of Illinois, Urbana, Ill.

R. Y. Williams, consulting engineer and member of the executive committee, Anthracite Production Control Plan, Pottsville, Pa.

In recognition of the vital role of operating management in efficient coal production, awards to mines carried with them the offer of individual awards to supervisors and members of the managerial staffs at the winning operations. Up to the time this report was prepared, requests for 854 individual certificates of merit had been honored. Since the conditions admittedly were stiffer and the difficulties accompanying production were substantially greater in 1945 than in 1944, the awards to men and mines consequently stand for correspondingly greater achievements in production and efficiency.

Twenty-four, one less than one-half, of the mines qualifying for 1945 awards also were represented in the list of 116 bituminous and anthracite operations receiving certificates in 1944. Production increases were reported by 37 of the 50 mines winning 1945 awards. The total increase was 1,326,935 tons, a welcome offset to part of the losses suffered by the industry largely through causes beyond its control in the first eight months of 1945.

Efficiency Up 5–56.4 Percent

Increases in efficiency were reported by 36 of the 1945 award winners. These increases ranged from 5 percent, the minimum for qualification, up to 56.4 percent, with the majority, as in 1944, falling in the range of 10 to 20 percent. An outstanding feature of the results was that of the ten mines standing highest in the list, with efficiency increases of over 20 percent, at least eight have been in operation many years—striking indication that management need not feel that an "old" operation limits the possibilities of modern equipment and methods. Correspondingly important, although not so spectacular, were the solid increases reported by many operations already noted for having reached high levels of productivity—equally striking indication that improvements in management, equipment and methods, with consequent improvements in efficiency, still are very much a possibility even where the most modern of facilities are employed.

Better management, as in 1944, led the list of reasons given for efficiency and production increases in 1945. More and better mechanization was second, concentrated and better supervision was third, and closer cooperation and better relations between management and men was fourth. Additional reasons submitted by those entering for the efficiency award ran the gamut of accepted methods of increasing efficiency, boosting tonnage, cutting cost, and promoting safety.

"Increased mechanization, better management, and better utilization of available manpower by job training in critical skills" were cited by officials at one operation that increased its output per man-shift 56.4 percent—the biggest increase reported.

Reasons given by the mine standing second were summed as follows: "Betterment of natural conditions and better management and layout, with 'pre-engineered' working sections." The increase in output per man-shift at this operation was nearly 52 percent, while another property reporting over 49 percent stated that "additional working places were created by opening the seam directly above the seam in which this mine is in operation; connecting tram road was built and both seams are mined and dumped simultaneously."

Cooperation a Factor

Closer inspection by management" was cited for an increase of nearly 37 percent in another case. "Improved cycle of operation, more competent supervision and closer cooperation between management and employee" were declared to be the major factors at another property registering an increase of nearly 34 percent.

"Mechanization and better management," "mechanization" alone and "improved mechanization" were the laconic statements of officials at three additional operations with increases of 29, 25 and 23 percent, respectively. Indicating also what can be expected in some instances by the elimination of bottlenecks with consequent overall improvement in results, one mine increasing output per man-shift slightly more than 23 percent reported that the "main haulroad, which had gotten in bad condition, was completely overhauled last year and this speeded up the entire transportation system."

Efficient mine operation also takes in many other activities in addition to management, supervision, employer-employee relations and mechanization of the loading operation, although many, while bearing different labels, are really also part of management in its broad sense. In addition to the "Big Four" and other activities already cited, including training, better planning of operations and improved transportation, the following naturally found places in the lists of reasons underlying better operation: better mining methods, concentration of workings, improved working cycle, better maintenance, safer operation, additional plant and equipment, improved supply handling and distribution, better face preparation, better surface preparation, more men, and better natural conditions.

The 1945 results again proved the validity of the conclusions and brought out that to them might be added stimulation of the competitive spirit and fuller utilization of the desire to excel on the part of both management and men by proper presentation of the facts as to the need for production and efficiency, promotion of friendly rivalry, and tangible recognition for jobs well done. That the latter can be a big factor in results is confirmed by experience in conducting the "Coal-for-Victory" award programs. Two statements as to the value of the awards in promoting increased interest in tonnage and greater output per man-shift are quoted in the preceding feature in this issue on "How to Gain Miner Cooperation" (pp. 86-91). Many others have been received by *Coal Age*. Wrote one operator: "We believe that last year's awards definitely helped in maintaining production." Another declared: "These awards last year were very definitely an incentive to increased production and increased efficiency at our mines."

Important as was the immediate objective of increased effort by management and men—fueling the war effort—the long-range implications now bulk as the big item in coal mining. Higher efficiency, higher quality, and greater safety mean low prices to consumers for a quality product with good wages to miners and reasonable returns to stockholders. The wartime contribution of the award winners, as well as the equally significant contribution of the many others who, for reasons often beyond their control, were not able to qualify, stand as major signposts to a more prosperous future.

Credit Well Earned

At the conclusion of proceedings to determine the 1945 "Coal-for-Victory" award winners at Washington, D. C., Nov. 2, the board of judges and representatives of Coal Age joined in the following statement:

"Fifty mines throughout the country have qualified for 1945 "Coal-for-Victory" awards on the basis of entries submitted to the judges. Reflecting as they do the spirit and enterprise that were responsible for a notable and substantial contribution to the cause of Allied victory, these 50 operations, their officials and their employees have earned the right to receive the most sincere congratulations.

"Congratulations also are due numerous other mines and collieries throughout the industry for excellent records even though, for various reasons, they failed to qualify for awards. Many of these operations fell short of meeting the requirements for awards by only the narrowest margins—often because of circumstances well beyond their control. Yet, their performance in the face of real difficulties has earned them praise for a real contribution to the war effort. Their determination to better their records for the benefit of the war effort and the future progress of the industry was no less sincere than that of the actual winners.

"We wish, therefore, to take formal and public notice of the real and effective efforts of these mines and collieries and to commend them, their managements and their employees to the utmost for a task well carried out and a future well begun."

Looking east in the pit, where both overburden and coal are being loaded on two levels and drills are operating on three levels.

FOUR VEINS STRIPPED

In 25-Ft. Benches to Get 2,200 Tons Daily

30,000,000 Cu.Yd. of Overburden Moved Since Beginning of Operations—Two-Contractor Plus Company Arrangement in Effect Since 1940—Truck and Rail Units Move Coal to Breaker for Preparation

By RALPH R. RICHART
Assistant Editor, Coal Age

MOVING more than 270,000 cu.yd. of overburden a month from four veins permits mining 2,200 tons of anthracite a day at the Monitor stripping of the Philadelphia & Reading Coal & Iron Co., Locust Gap, Northumberland County, Pa. More than 30 million cu.yd. of overburden has been moved from this project since operations were started in 1929. Since 1940, when work was speeded up and a two-contractor plus company arrangement became effective, shovel-front and trucking operations have been used on 25-ft. benches to move the overburden and recover the coal. Using this multi-level method of attack, coal has been recovered from the Mammoth vein as far as 280 ft. below the surface. The ratio of overburden to raw coal runs 4.8 to 1. It is estimated that there is enough coal for two more years of operation.

Four veins figure in this stripping project and are worked in this order: (1) No. 10½, or Rough, 10 to 12 ft.; (2) No. 10, or Holmes, 6 ft.; (3) No. 9½, or Four Foot, 4 ft.; and (4) Mammoth, 25 to 30 ft. The Skidmore vein, lying some 25 ft. below the Mammoth, is not stripped. Operations are confined to a local basin near the outcrop of the inclined structure lying on an east and west line. Many faults exist throughout the area. An upward thrust along the south side of the basin has introduced a saddle-like formation in each vein. Aside from the Mammoth, none of the veins had been mined previously. As early as 1880, both first and second mining was done in the Mammoth, but only the top bench, or 10 ft. of coal, was mined in these first attempts at working this vein.

Stripping and transporting the coal over to P. & R.'s Locust Summit central breaker, now barely a mile away, keeps two contractors and a part of the P. & R. organization busy. All of the overburden is blasted, loaded, hauled and dumped by one contractor, the Dick Construction Co., Hazleton, Pa. Afterward, the coal is loaded by P. & R. and then trucked to the rim of the pit by still another contractor, W. H. Thomas & Bros., Shamokin, Pa. At the rim of the pit it is dumped into 44-ton cars and hauled over the company-owned electrified railroad to the breaker. All engineering work is done by the P. & R. staff.

Roads Are All-Weather

Throughout the 94-acre area where most of today's operations are concentrated spreads a 3-mile network of excellent all-weather roads. Each road is at least 50 ft. wide, level on the turns and never steeper than 8 percent. For a base, all roads have a 2- to

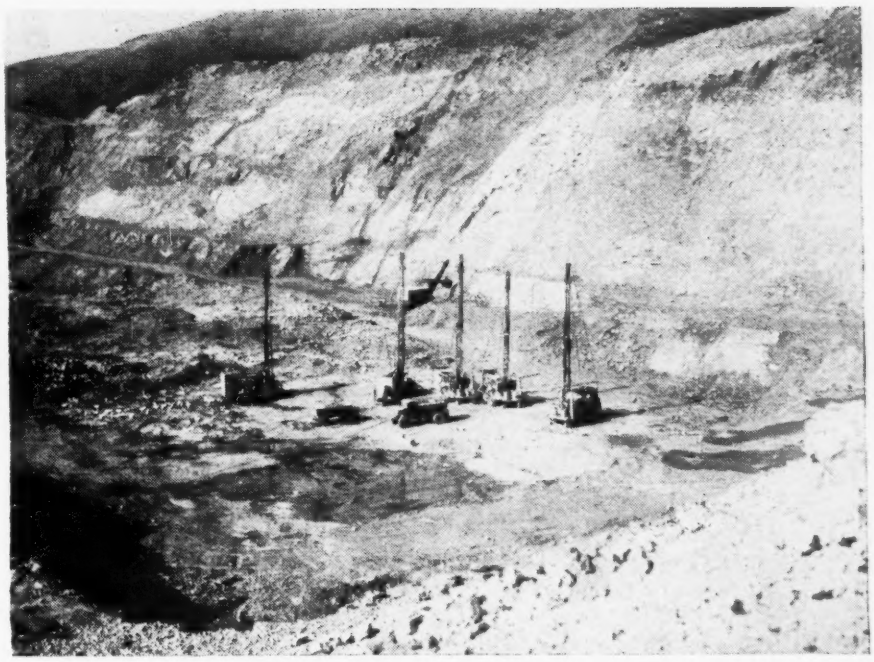
3-ft. layer of broken conglomerate. A 25-ft. band of conglomerate between the No. 9½, or Four Foot, and the Mammoth is used exclusively for road-building material. The contractor moving the overburden must also build and maintain the roads over the entire project.

Drills Work on Benches

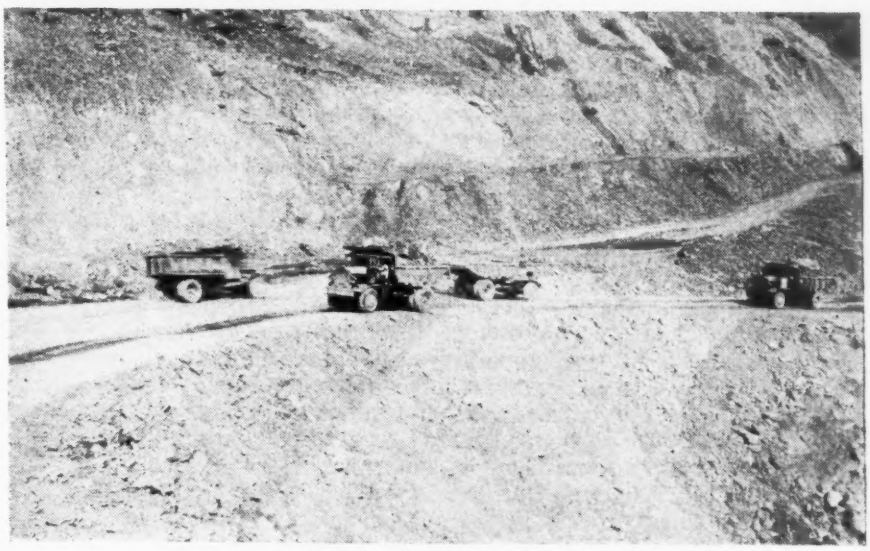
Batteries of Type 29T and 42T 9-in. Bucyrus-Erie well drills operate on top of the 25-ft. benches, which are wide enough to prevent overburden blasted from one level from splashing over onto the next lower level. It was on this property that the 9-in. blast-hole drill was pioneered in 1938. Results, such as faster penetration and the placing of a larger charge at a given position in the hole, have led to better shooting and a faster drilling schedule. This changed the drilling picture completely. Where crews on 30 6-in. drills previously had found it difficult to keep up the drilling, crews on eleven 9-in. drills now do the work in three-shift operation.

The drills, operating from 440-volt circuits, drill holes 27 to 30 ft. deep on 16- to 18-ft. centers each way. The idea behind drilling deeper than the regulation 25-ft. bench is to make certain that the full 25-ft. bench can be loaded without leaving any high, hard spots to interfere with the trucking operations. In starting a hole in soft material the drillers use a 10-in. casing 8 to 12 ft. long. Where the holes actually reach to the coal 2 ft. of stemming is dropped in the hole before the explosive is inserted. Each hole is charged with 150 to 200 lb. of 40-per-cent-strength gelatin dynamite. Consumption of explosives is between 0.8 and 0.9 lb. per cubic yard of overburden, which consists of slate, conglomerate and sandstone. Hercules and Atlas supply the explosives month about. At the time of writing this article, 7½x20-in. sticks of Hercules gelatin extra 40 percent strength dynamite, one 50-lb. stick to the box, were being used. Primacord-Bickford detonating fuse is used in firing all holes. While the drills operate three shifts the holes are all loaded on the day shift by the same man. The drill crews furnish this man with a log of each hole to assist him when it is necessary to use deck loading. The shots sometimes lay for days before they are fired, waiting until a shovel is ready to load a certain section. In shot material the slope of the bank is maintained at 60 deg., but in clay and washed bank material it is 1½ to 1.

Three 2,300-volt Bucyrus-Erie electric shovels (two 170-B's with 40-ft.



A battery of 9-in. well drills in action between the Holmes and Four Foot veins.



Loaded trucks always use the left-hand side of the road.

Coal dumped from the trucks into 44-ton cars is hauled over the electrified system to the Locust Summit central breaker.

Looking east in the pit, where both overburden and coal are being loaded on two levels and drills are operating on three levels.

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In 25-Ft. Benches to Get 2,200 Tons Daily

30,000,000 Cu.Yd. of Overburden Moved Since Beginning of Operations—Two-Contractor Plus Company Arrangement in Effect Since 1940—Truck and Rail Units Move Coal to Breaker for Preparation

By RALPH R. RICHART
Assistant Editor, Coal Age

MOVING more than 270,000 cu.yd. of overburden a month from four veins permits mining 2,200 tons of anthracite a day at the Monitor stripping of the Philadelphia & Reading Coal & Iron Co., Locust Gap, Northumberland County, Pa. More than 30 million cu.yd. of overburden has been moved from this project since operations were started in 1929. Since 1940, when work was speeded up and a two-contractor plus company arrangement became effective, shovel-front and trucking operations have been used on 25-ft. benches to move the overburden and recover the coal. Using this multi-level method of attack, coal has been recovered from the Mammoth vein as far as 280 ft. below the surface. The ratio of overburden to raw coal runs 4.8 to 1. It is estimated that there is enough coal for two more years of operation.

Four veins figure in this stripping project and are worked in this order: (1) No. 10½, or Rough, 10 to 12 ft.; (2) No. 10, or Holmes, 6 ft.; (3) No. 9½, or Four Foot, 4 ft.; and (4) Mammoth, 25 to 30 ft. The Skidmore vein, lying some 25 ft. below the Mammoth, is not stripped. Operations are confined to a local basin near the outcrop of the inclined structure lying on an east and west line. Many faults exist throughout the area. An upward thrust along the south side of the basin has introduced a saddle-like formation in each vein. Aside from the Mammoth, none of the veins had been mined previously. As early as 1880, both first and second mining was done in the Mammoth, but only the top bench, or 10 ft. of coal, was mined in these first attempts at working this vein.

Stripping and transporting the coal over to P. & R.'s Locust Summit central breaker, now barely a mile away, keeps two contractors and a part of the P. & R. organization busy. All of the overburden is blasted, loaded, hauled and dumped by one contractor, the Dick Construction Co., Hazleton, Pa. Afterward, the coal is loaded by P. & R. and then trucked to the rim of the pit by still another contractor, W. H. Thomas & Bros., Shamokin, Pa. At the rim of the pit it is dumped into 44-ton cars and hauled over the company-owned electrified railroad to the breaker. All engineering work is done by the P. & R. staff.

Roads Are All-Weather

Throughout the 94-acre area where most of today's operations are concentrated spreads a 3-mile network of excellent all-weather roads. Each road is at least 50 ft. wide, level on the turns and never steeper than 8 per cent. For a base, all roads have a 2- to

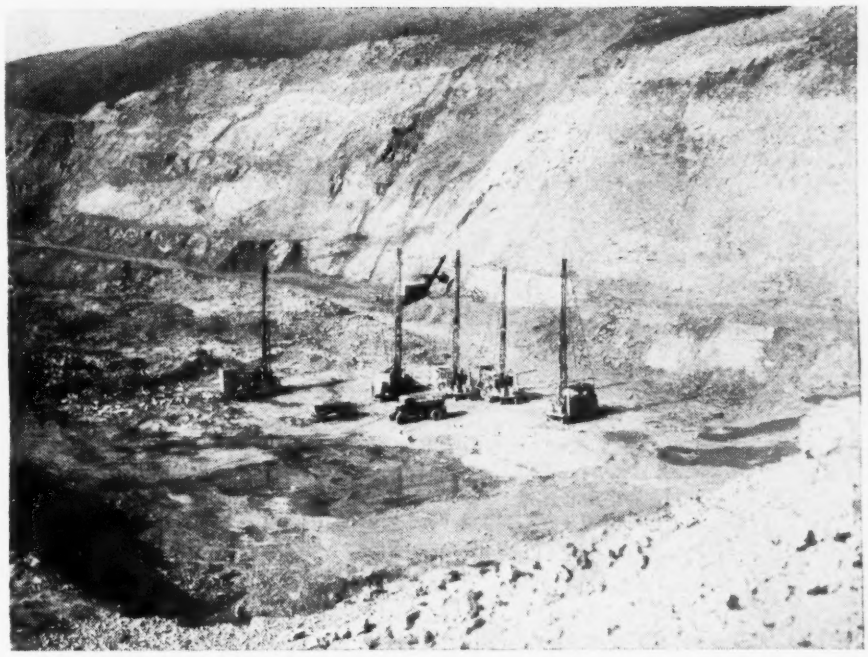
3-ft. layer of broken conglomerate. A 25-ft. band of conglomerate between the No. 9½, or Four Foot, and the Mammoth is used exclusively for road-building material. The contractor moving the overburden must also build and maintain the roads over the entire project.

Drills Work on Benches

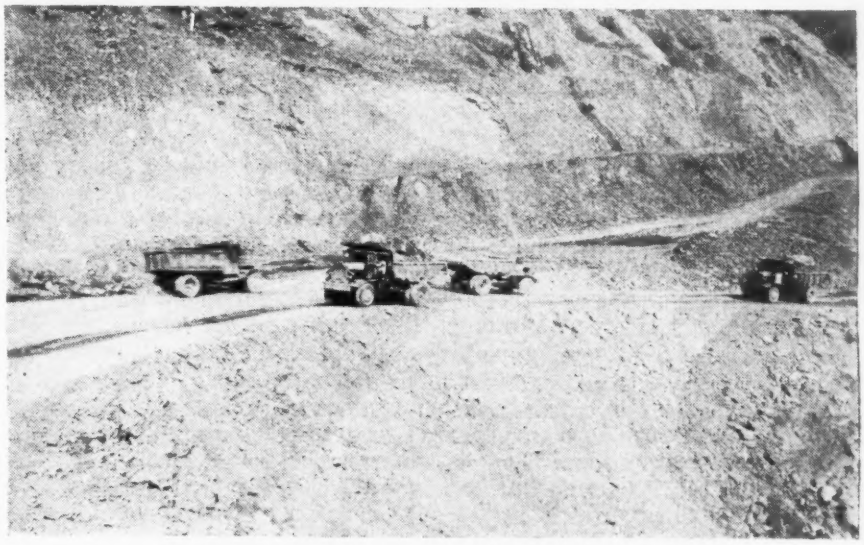
Batteries of Type 29T and 42T 9-in. Bucyrus-Erie well drills operate on top of the 25-ft. benches, which are wide enough to prevent overburden blasted from one level from splashing over onto the next lower level. It was on this property that the 9-in. blast-hole drill was pioneered in 1938. Results, such as faster penetration and the placing of a larger charge at a given position in the hole, have led to better shooting and a faster drilling schedule. This changed the drilling picture completely. Where crews on 30 6-in. drills previously had found it difficult to keep up the drilling, crews on eleven 9-in. drills now do the work in three-shift operation.

The drills, operating from 440-volt circuits, drill holes 27 to 30 ft. deep on 16- to 18-ft. centers each way. The idea behind drilling deeper than the regulation 25-ft. bench is to make certain that the full 25-ft. bench can be loaded without leaving any high, hard spots to interfere with the trucking operations. In starting a hole in soft material the drillers use a 10-in. casing 8 to 12 ft. long. Where the holes actually reach to the coal 2 ft. of stemming is dropped in the hole before the explosive is inserted. Each hole is charged with 150 to 200 lb. of 40-per-cent-strength gelatin dynamite. Consumption of explosives is between 0.8 and 0.9 lb. per cubic yard of overburden, which consists of slate, conglomerate and sandstone. Hercules and Atlas supply the explosives month about. At the time of writing this article, 7½x20-in. sticks of Hercules gelatin extra 40 percent strength dynamite, one 50-lb. stick to the box, were being used. Primacord-Bickford detonating fuse is used in firing all holes. While the drills operate three shifts the holes are all loaded on the day shift by the same man. The drill crews furnish this man with a log of each hole to assist him when it is necessary to use deck loading. The shots sometimes lay for days before they are fired, waiting until a shovel is ready to load a certain section. In shot material the slope of the bank is maintained at 60 deg., but in clay and washed bank material it is 1½ to 1.

Three 2,300-volt Bucyrus-Erie electric shovels (two 170-B's with 40-ft.



A battery of 9-in. well drills in action between the Holmes and Four Foot veins.



Loaded trucks always use the left-hand side of the road.

Coal dumped from the trucks into 44-ton cars is hauled over the electrified system to the Locust Summit central breaker.

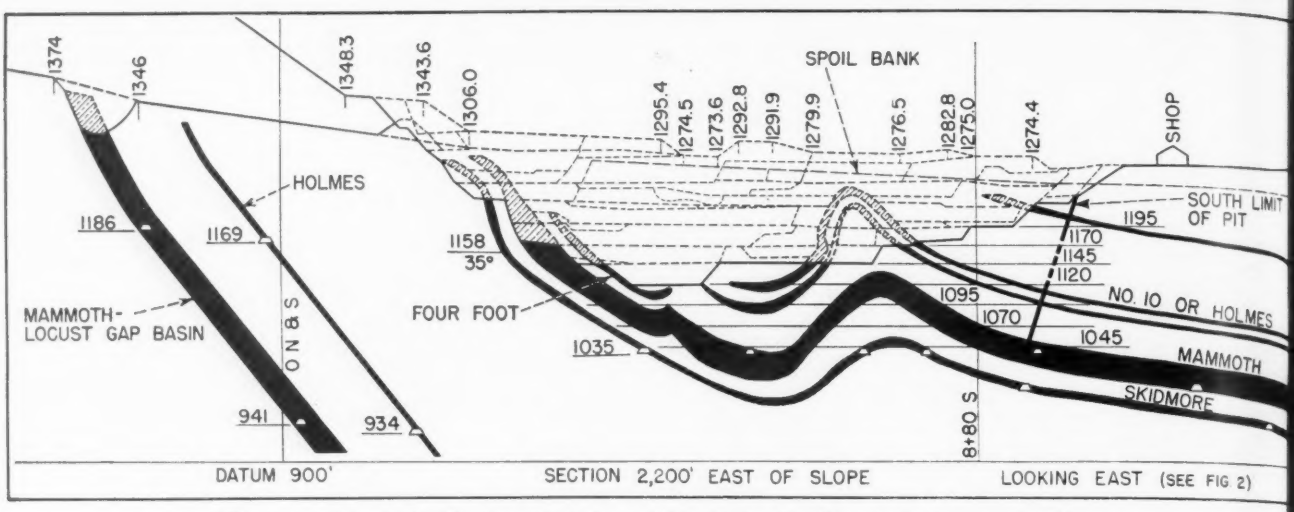


Fig. 1—A cross-sectional view about the position of the dragline shown in the general view of pit operations.

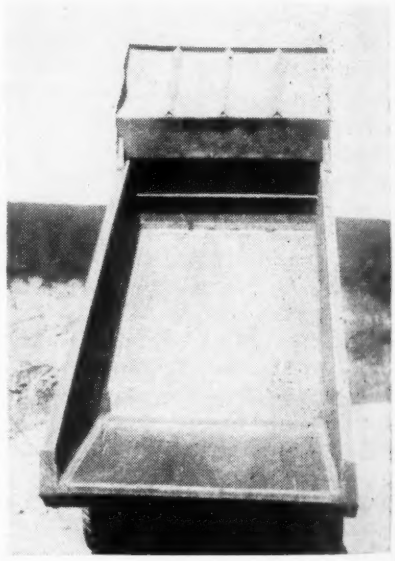
booms and 6-yd. dippers and a 120-B with a 38-ft. boom and a 4-yd. dipper) load the broken overburden two shifts a day into a fleet of 38 10-yd. Euclid rear-dump trucks. Each shovel loads first to a truck on the right and then to one on the left, and it is a rare occasion when the dipper is in the air waiting for a truck. Average truck loading is 6.45 cu.yd. Of the 38 trucks, all powered with 6-cylinder 150-hp. Cummins diesel engines (without superchargers) using Gulf fuel oil, about 30 are required for regular service in the pit. Five are kept as spares ready for service, while three are undergoing overhauls in the shop. These trucks have leaf springs in front and rubber cushioners on the rear and to date not a single back axle has broken.

Most of the trucks are equipped with 14.00x24 Firestone or Goodyear tires, six to a truck. During the war, emergencies necessitated the use of 16.00x24 tires in some instances. This experience may lead to the general use of this size on all the trucks. Drivers use the left-hand side of the road. This enables them to better gage their position on the road and thus better protect the dual tires on the back from small boulders lying on the side. During the summer and fall, when the weather usually is good, the trucks haul to a more distant dumping point, 2,600 to 3,500 ft. This leaves a much closer area for dumping during bad weather. Under this arrangement each driver can make 30 or more trips in seven hours. The fleet often has dumped as high as 1,000 loads in a 7-hour shift. Each driver keeps a record of the number of trips he makes and at the end of the shift it must tally with the one kept by the checker at the shovel.

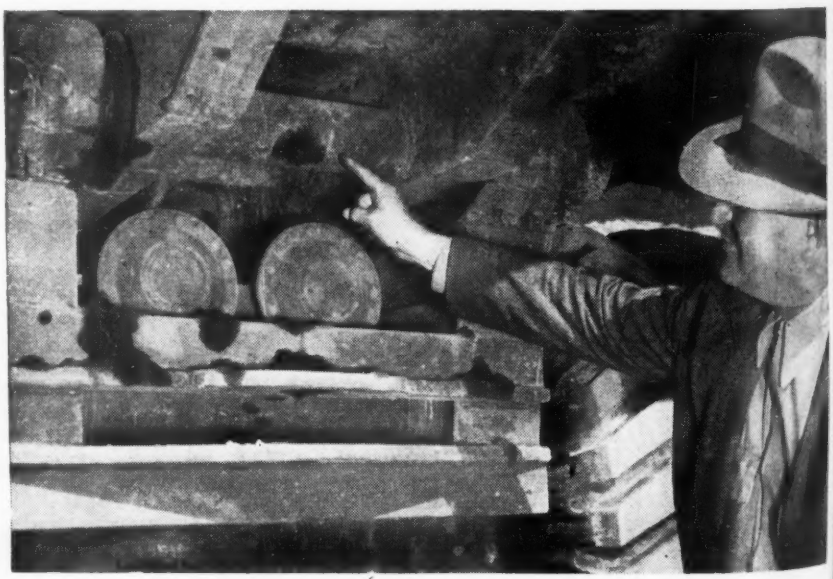
Five International Model T-14 and T-18 bulldozers with Bucyrus blades clean up around the shovels and service the 1,000-gal. water tanks for each group of well drills.

An engineering party of four or five men is required to run lines, stake out grades and to calculate (at 25-ft. intervals) the areas of overburden moved each month by the contractor.

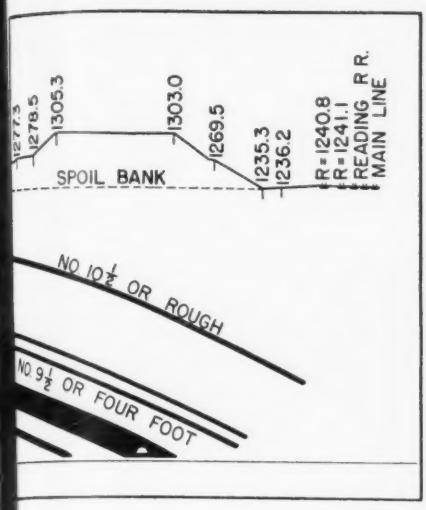
Using Bucyrus-Erie loading units consisting of a 50-B electric dragline (2-yd. bucket), a 50-B electric shovel (2-yd. dipper) and a 44-B diesel convertible unit (2-yd. capacity), the coal company loads the daily output of 2,200 tons in a 7-hour shift. Whenever it is necessary to shoot the coal, and the hard bottom bench of the Mammoth is one vein that must always be shot, holes are drilled by compressed air (Ingersoll-Rand equipment) and fired with 1¼x8-in. Atlas



A new shop-built body (in raised position) takes its turn hauling overburden.



Showing the change that eliminated rocking of the body during the dumping operation and saved making lifting-jack replacements.



F. C. Caldwell, P. & R. division superintendent, has his headquarters at Ashland, Pa.

40 percent dynamite and Primacord-Bickford detonating fuse. All rain that falls in the pit drains by way of the old workings in the Mammoth to the Locust Gap collieries.

All the coal is trucked from the pit by a separate contractor using a fleet of eleven 9-yd. Sterling (gasoline) rear-dump trucks. At the rim of the pit the trucks dump from a ramp into 44-ton automatic drop-bottom standard-gage cars. Ten such steel cars equipped with Timken bearings are hauled, two at a time, to the Locust Summit central breaker by either of two 30-ton Baldwin-Westinghouse 275-volt locomotives. So important is this link in the transportation system that two m.g. sets, independent of each other in the matter of transformer stations, are available for supplying power.

Prior to the present trucking arrangement the locomotives used to take the cars into the pit and to the loading shovels. Because of the 3-percent ruling grade and space limitations, the rail system could not go deeper and was abandoned in favor of truck haulage and roads with 8 percent as the ruling grade.

All heavy maintenance work is done in the Dick Construction Co. shop on the job. Truck and shovel repairing requires the services of 25 men over a three-shift schedule. One mechanic and a helper work solely on overhauling the diesel engines. Records point to a service life of 9,000 to 13,000 hours for new engines and 7,000 to 8,000 hours for reconditioned ones.

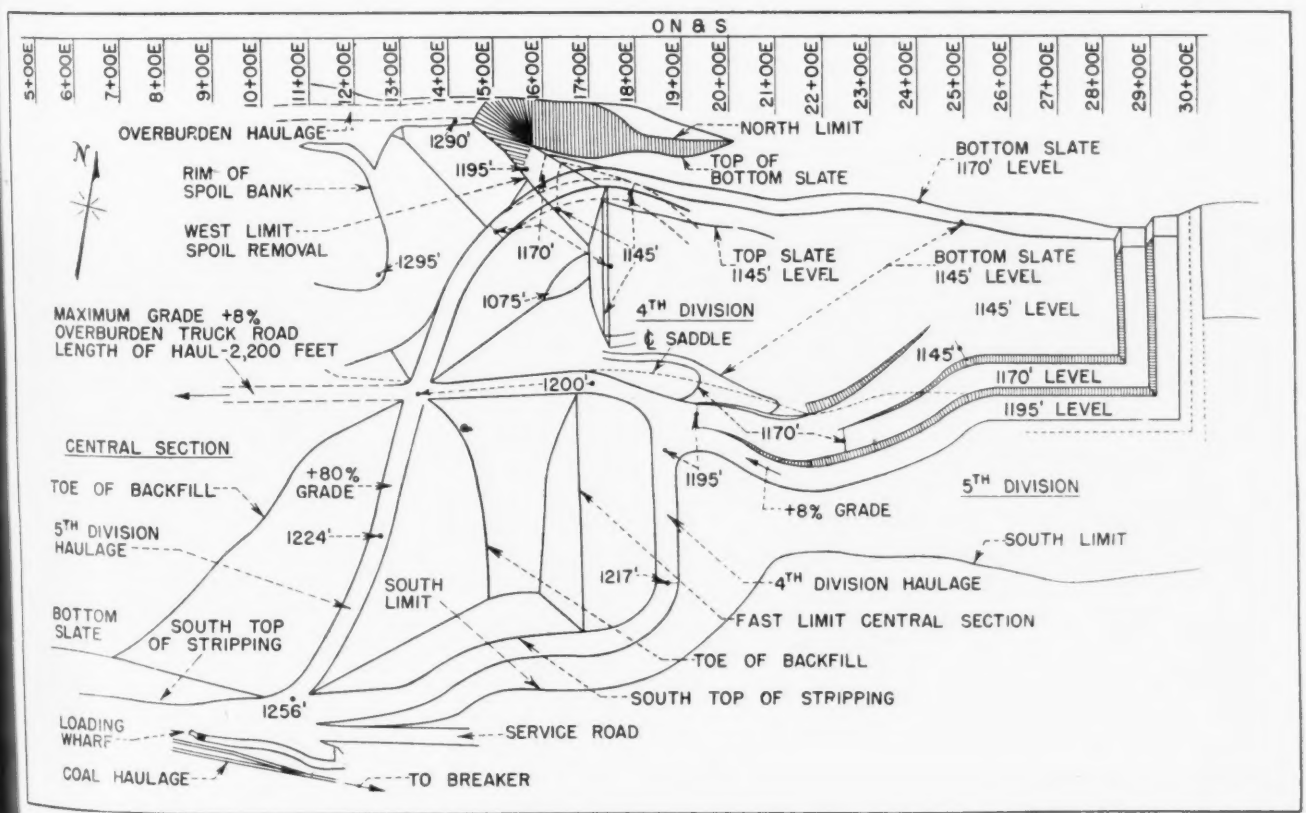


Fig. 2—How the roads were arranged for serving the pit at the time this article was prepared.

G. A. Schnee, division engineer, has charge of a 25-man engineering staff.

affects the bearing assembly about which the body pivots while dumping. A heavier shaft protected by a pipe casing welded between the pivot braces reduces the rocking effect of the body, particularly when the bed is raised and happens to be loaded heavier on one side. In effect it makes one long bearing by joining the two original bearings, which are separated by some 20 in. Grease forced in at the Alemite fitting lubricates the entire bearing and helps to exclude the dust. This change has eliminated frequent breaking of the lifting jacks.

Stick Design Altered

Dipper sticks are fabricated in the shop but the pinion racks are purchased from the manufacturer and are attached to complete the job. The design of the dipper stick has been altered in the light of experience gained in the field. In another shop, 9-in. drill bits are hot milled and gaged at the rate of 22 per shift on an Ingersoll-Rand machine. Afterward, the bits are tempered in water.

Two reconditioned engines are held in readiness for immediate installation. Three mechanics can remove an engine and install another in seven hours.

Instead of buying new dump bodies the contractor builds his own—six within the last year. Some of the features include liner plates, special bracing at the end, one-piece bottom with square corners and heavier construction throughout. These bodies weigh 1,000 lb. more than the original ones.

Another change made on the truck, illustrated elsewhere in the article,

William Shuttleworth is stripping superintendent for the Monitor stripping.

Monitor stripping operations come directly under F. C. Caldwell, division superintendent; G. A. Schnee, division engineer; J. W. Prosser, stripping engineer; and William Shuttleworth, stripping superintendent, Ashland (Pa.) division office. Located at the operation headquarters at Pottsville are George A. Roos, general manager; E. S. Christ, assistant general manager; Edward A. Lynch, director of personnel; William C. Muehlhof, chief engineer; John B. Hicks, transportation engineer; Harry A. Leidich, safety inspector; Albert Brown, electrical engineer; C. E. Brown, mining engineer; and H. R. Hagen, mechanical engineer. R. E. Taggart, president, has his offices in Philadelphia and Pottsville.

Officials and supervisors of the Dick Construction Co. at the stripping are: Donald B. Dick, superintendent; Clarence J. Reeves, foreman; Harry Hinderlither, assistant foreman; William Lex Jr. and Anthony Danielovits, second and third shift foremen; and Claude Stauffer, shop foreman. George Thomas supervises the trucking of the coal for W. H. Thomas & Bros.

J. W. Prosser, P. & R. stripping engineer (left), and Clarence J. Reeves, foreman, Dick Construction Co., are two reasons why the work progresses smoothly.

George Thomas superintends the coal-trucking operations.

MAINTENANCE

For More Efficient Coal Preparation*

Tank and Flume Life Lengthened by Good Materials, Installation and Lining—Lubrication Important in Operation of Conveyors and Elevators—Good Maintenance Helps Crushers, Dryers and Other Equipment

By FRED W. RICHART
Assistant Editor, Coal Age

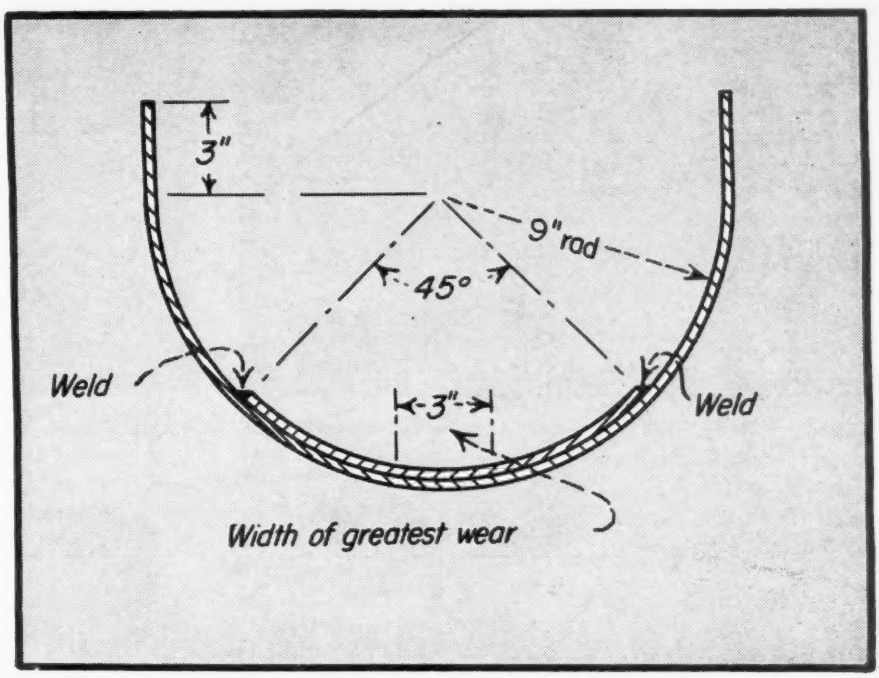
CONES, tanks, flumes, conveyors, elevators, machine drives, crushers, dryers and oil-treating equipment also are prime concerns of maintenance men around coal-preparation plants. Some of the problems in connection with such equipment and how they have been worked out in the field are the subject of the following material, which supplements data on maintaining cleaning equipment and coal-handling facilities in the October *Coal Age* (p. 105) and pumps, pipe and screens in the November *Coal Age* (p. 90).

Cones, Tanks, Flumes

Settling cones, which are not as popular as they once were, are subject to heavy wear from the fine pyrite in circulating water. Very few plants with cones with five or six years of service but have found it out. That possibly is one of the reasons for the construction of concrete settling tanks in many recent washers, although such tanks date back several years.

The elevated cone has one advantage where conditions otherwise are favorable. The slurry may be flumed out to a settling pond by gravity—a saving in cost and in maintenance of pumping equipment. Being under little pressure, flumes possibly are easier to keep up than pipelines.

A certain plant decided to take advantage of a shutdown to examine the inside of the cone and paint it. A man was set to work wire-brushing the interior. There was a surprise when he brushed holes through the steel plate. Something had to be done. Someone suggested paving the inside with brick. Hard brick were laid in cement mortar for a distance of 15 ft. up from the bottom. After four years of service that job still serves. This was a large settling cone in a plant of 800 tons per hour capacity.



Showing area of greatest wear and lining in flume design employed at one mine where the slurry is moved by gravity.

They learned that the top side of the rivets was eroded and the bottom side was not, that the whole sloping surface of the cone was eroded and that the condition of the sheets grew rapidly worse toward the bottom. Condensation of cutting material and greater particle speed explain this.

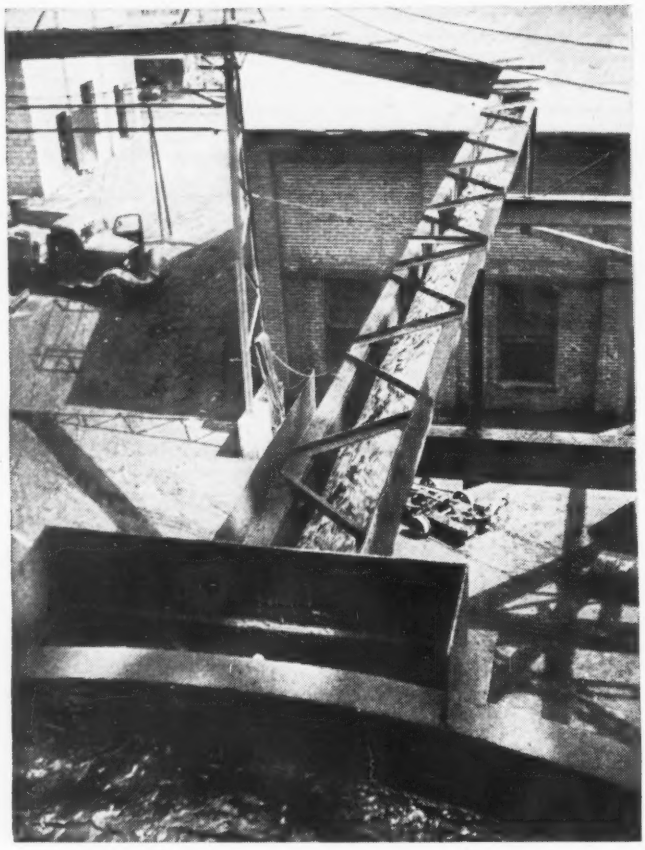
Another washery built in 1937 has a rather small cone. By 1944 the outer surface had been patched and repatched by arc welding until a new 10-ft. section of the bottom had to be put in. Only the lower 4 ft. had failed. Similar experiences have led washery operators to suggest that the bottom 4 ft. of the cone should be so constructed that it may be replaced bodily without disturbing the upper part or any of the piping connected to it.

Where the slurry flow from the bottom of the cone is regulated by valves, they also are subject to severe wear. One washery builder has designed renewable nozzles in a wide range of sizes to regulate slurry flow to output, avoiding regulation by a partly closed valve. In addition, the renewable valve disks and seats are made of hard metal that resists the grinding effect of the slurry.

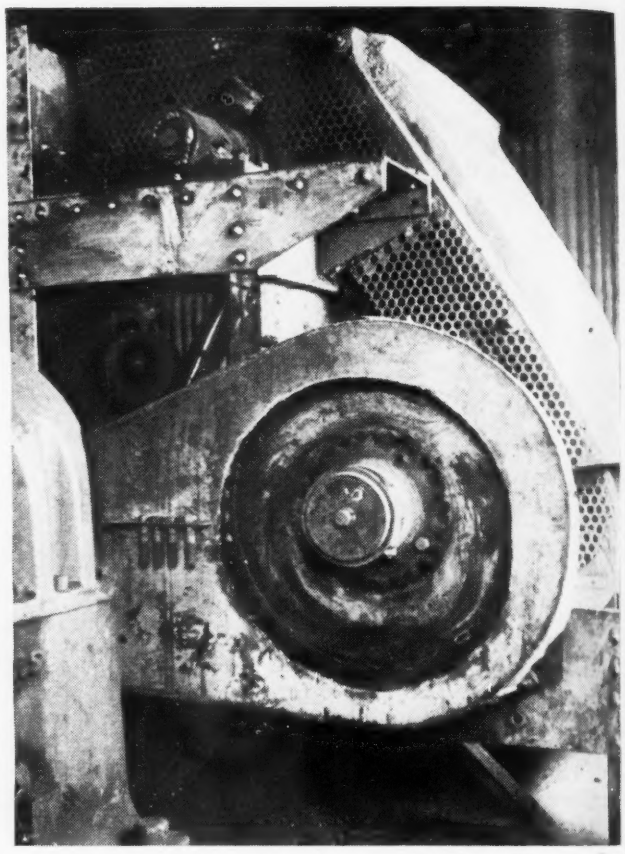
Where it can be done, handling solids by gravity in a flume is less expensive than pumping. That method is used to transfer washed coal from jig box to classification and dewatering screens, and for sluicing slurry to spoil piles and settling ponds. These solids cause erosion, exposing fresh metal to corrosion. Alternate erosion and rusting wears away the metal quite rapidly. This applies to pumping or sluicing ducts.

Coal-carrying flumes that have considerable width, particularly those

*Third and last of a series of articles on practical methods of handling maintenance for increased efficiency in coal preparation.



This slurry flume, after being readied for repair, was coated inside with asphalt. It has lasted two years.



This conveyor is protected by metal shear pins. Note the rack at the left where the spares are kept handy.

that feed wide screens, must have several partition plates at the curves to keep water and coal spread out evenly; otherwise, screening is not well done. These partitions often are lined with wearing plates on the outer curve to take the wear. Such plates are tacked into place by arc welding so that replacement may be easily and quickly done.

Steel flumes that carry slurry wear rapidly. They usually are relined with steel sheets after two to four years, depending on the quality and quantity of solids in the water. One company reports that flume bottoms wear out three times as fast as conveyor bottoms. Another statement is that wet coal wears conveyor bottoms three times as fast as dry coal. The statements are not conflicting but indicate that when gritty material is dragged wet or flumed in running water, excessive grinding action may be expected.

Glass is being increasingly used for lining flumes, particularly in the anthracite region, with excellent results. One well-laid-out flume made of U-shaped steel sheets wore so thin after four years that renewal was considered. Another suggestion was a heavy coat of asphalt on the inside. Application was cheap and quickly done. After two years the flume seems in perfect condition with the plant working two shifts a day.

Flumes made of concrete or sewer tile seem to wear indefinitely and operate successfully. A washer on high ground flumes the slurry to old pits below the washer in a concrete-lined ditch. It will outlast the mine. A pitch of $\frac{3}{16}$ in. per foot ($1\frac{1}{2}$ percent) is satisfactory for carrying slurry.

Conveyors, Elevators

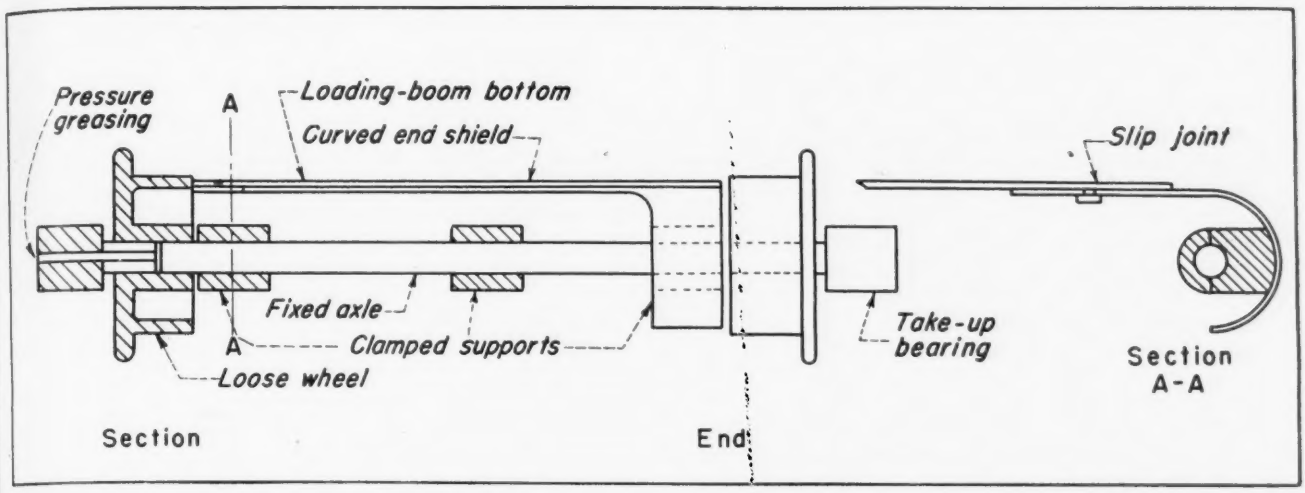
Conveyors and elevators make up a large percentage of the equipment of a coal-preparation plant. The multiplicity of parts puts a heavy responsibility on the maintenance crew because of the number of chances for failure and because one such unit may cause a complete shutdown.

There are two general types of conveyors: chain and rubber belt. The use of rubber belts is increasing. They are very successful and deservedly popular—so popular that some washery owners will not use a chain where a belt will do the work. Users generally declare the maintenance is much less than for steel conveyors. A belt engineer says the life is much longer than steel and the power cost only one-third.

Modern practice is to mount the belts on idlers fitted with sealed (lubricated-for-life) ball or roller bearings. In case of bearing failure the noisy idler with its shaft and bearings is quickly replaced with a wrench. Where water or dust can get into these bearings the life may be reduced. Therefore, they require a measure of protection.

The life of rubber belts depends on the quality, the material they handle, the alignment of troughing and idler rollers, speed and surrounding conditions. Loading-boom belts are sometimes damaged during lowering into a car. The life runs four to seven years. At one plant the practice is to extend the takeup as far as possible when installing a new belt. This provides sufficient length to cut the ends several times before a new piece must be spliced in. Boom belts are spliced with metallic fasteners at this plant. The small size of boom belts and the possibility of minor damage do not justify making them endless.

Torn and damaged belt areas may be made practically new by vulcanizing. This is the practice at a number of plants. Reports as to possible damage to the fabric from calcium chloride seeping in at the splices are conflicting. Some say they have observed no rotting whereas others are quite sure that some occurs.



This toothless-sprocket loading-boom end was designed to prevent conveyor chains climbing worn sprocket teeth and breaking. The loose smooth-tread wheels eliminate the trouble. The semicircular end shield has three supports clamped on the shaft to make it rigid. Slots in the shield and T-shaped lugs hold the shield up to the boom bottom.

At a plant with an enviable record for low maintenance cost the preparation engineer says all belts should be made endless and vulcanized, even at a probable cost of $100 per splice. The advantages, according to this engineer, are: less danger of catching on something than when metallic fasteners are used; water is excluded from the fabric because it is incased in rubber; vulcanized belts can be run at 350 to 400 f.p.m. whereas belts spliced with metal fasteners should be kept down to 300 f.p.m.

Belt Maintenance Aids

Belts spliced by a factory expert are more likely to run true. To keep them running true they must be centrally loaded. Therefore, coal must be delivered centrally on the belt. All long belts are provided with some sort of aligning idlers called "trainers," which automatically keep the belt from running to one side or wabbling. The vertical pulley is going out of fashion because it wears the rubber off the edge of the belt. Two other commonly used types are pivoted troughing trainers and forward-tilt troughing trainers. In the first, a set of troughing idlers is made to swivel forward on the high side of the belt, automatically bringing the high side down. Forward-tilt troughing idlers have a permanent tilt forward of about 2 deg. In the first instance the trainers are set 20 to 80 ft. apart; in the second they are all alike. In the latter type experience with a number of long conveyors indicated that a trainer about every tenth troughing idler gave better results. Special trainers are made also for the return side of the belt. They are customarily spaced 60 or 80 ft. apart.

Substitutes for rubber belts are on the market. A fabric boom belt is being tried out at one plant. When oil-soaked it operates satisfactorily. In winter, if not oil-soaked, it absorbs moisture and freezes stiff. When used for minus 3-in. coal it lasts remarkably well. Recently oilproof synthetic belts have been put into service.

There are two general types of conveyor chain—with and without rollers. There are many styles of links made of various steels and alloys. Out of scores of possible choices perhaps half the washery conveyor chains in one coal region are known as "rivetless" and are furnished in various alloys by numerous manufacturers. The links are drop-forged, which insures uniformity, strength and life.

Occasionally, for large flight conveyors, and less frequently for picking tables and apron-type loading booms, roller chains are used. Most of these are drip-oiled, which is not too satisfactory. There is some indication that flush-oiling several times a day gives better results than drip. While the life of conveyor chains varies widely in different plants, two years for roller chains seem about the average. Under certain conditions it may be much longer. Two examples indicate the possibilities. One raw-coal conveyor chain, pressure fitted and religiously greased, had a life of seven years. Another roller chain with oil cellars in the rollers, handling mine-run at a transfer station, has a proved life of considerably more than two years.

Another pressure-fitted chain that handled a high tonnage of mine-run strip coal required a half day for two men to lubricate it. Because of the time required, pressure lubrication was abandoned for drip lubrication. The result was a chain life of two years.

Drip-oiling is fairly successful if the coal does not touch the chain. If it does, dry coal absorbs the oil and wet coal washes the oil off. Some washery operators suggest that conveyor chains buried in dry coal should not be oiled at all. One cheaply maintained plant uses the discarded crankcase oil from its fleet of diesel trucks for chain lubrication. This is poured into barrels set above the chains. Once an hour the oiler opens the valve and flushes the chain for a full round. Some oil reaches the bearing surface and gets results.

Non-roller-type chains include a wide variety of materials and forms of construction. Chains with flat-bar links are widely used because renewal links may be made in the mine shop. Some shops have jigs to drill links in quantity. Under favorable conditions they wear very well. Where flight fittings do not interfere, these and most other drag chains may be turned over to prolong the wear. Expected life from miscellaneous conveyor chains may run from one to two years. The volume of pyrite and grit largely controls chain life. Oil-sprayed coal prolongs the life of chain conveyors that handle it.

Conveyor Chains Switched

One large washery has a scheme of conveyor control that is of interest. Except for two conveyors, all chains are alike regardless of the work they do. A new chain is applied to the conveyor with the heaviest load. When that chain must be repaired, it is transferred to the second hardest job and on down the line to the easiest work. These chains are universal at this plant, since all the attachments may be applied to any standard link. These links and pins are made from SAE-

1045 steel, heat-treated to a Brinell of 385-400. The links last three times as long in dry coal, where they may be lubricated some, compared to conveying wet coal, where they cannot be lubricated at all.

The rivetless chain is a popular type. It is made up in several sizes and of materials of varying hardness and abrasive resistance. This type of chain is used in almost every application around a washing plant except jig-box refuse conveyors. The bolts may be turned 180 deg. to maintain a more accurate pitch and prolong the life.

One plant uses its spray-oil system for lubricating the general run of chains. Drip oilers on the chains are supplied with hot oil drawn from the spray lines. A chain life up to two years is obtained. The system is considered a fair success. Other plants use drip oilers in capacities of about 2 gal. or rely on hand application with a large oil can. One plant using the latter method gets a year's chain service and scraps the chains before failures become troublesome.

Bottom Replacement Eased

Conveyor guides come in for heavy wear and frequent replacement. Most conveyor troughs are built so that the bottoms can be easily replaced or conveniently relined. Equipment not originally built to facilitate these changes has been altered so that they can be made. A successful way of renewing conveyor bottoms is to tack them in place by arc welding, then weld the butted ends together. It is not necessary to smooth off the weld. Most conveyor flights do not reach the bottom and the coal soon levels the bead.

Plow bolts are not successful for bolting liners in place. The heads wear off and flights catch the free ends and double the lining over. That means a shutdown.

The life of conveyor liners and chain guides will vary as much as that of chains. It depends on whether the coal is wet or dry and on the abrasive impurities in the coal. The following comparison between two conveyors, each carrying 250 tons per hour, indicates what may be expected in bottom wear. Conveyor No. 1 handled ¾x0-in. dry coal. The bottom lasted just twice as long as that of conveyor No. 2, which carried 2x$\frac{7}{8}$-in. washed coal. Other washery men insist that wet coal will wear a conveyor bottom three times as fast as dry.

Few records of the use of stainless steel for conveyor bottoms are available. One mine superintendent states that high-strength alloy steel will last 67 percent longer than the usual carbon steel, and that it is worth more than its cost because of the saving in maintenance time. The same reaction comes from a maintenance engineer of another company, which changed over to the same alloy for loading-machine conveyors. He says: "It stays bright, does not rust and lasts far longer than the carbon steels used in the original construction."

One plant with a raw-coal chain conveyor having a permanent bottom uses ¼-in. liners of carbon steel. Two renewal liners have been installed since 1938. These are tacked in place by arc welding and are used until they wear through and the edges begin to peel up.

Most coal washers have one or more elevators handling coal or refuse, some of them submerged in a cone or tank at the lower end. This condition is similar to that of the refuse elevator in the jig box. The usual type of metal bearing for the foot shaft not only has short life but the shaft wears out quickly too. Plastic bearing linings wear three or four times as long as metal linings and shaft life is greatly extended.

Chain guides of inclined elevators wear very fast because lubrication is impossible. The remedy is hard material and frequent examination to permit change before failure. Broken guides are likely to catch and break a chain, which means a shutdown. Mention should be made of an elevator for 2-in. dry coal consisting of a vertical rubber belt with buckets bolted on similar to elevators used in grain elevators. Its capacity is 150 tons per hour. The plant is a two-shift washer installed in 1938. "This elevator has no upkeep cost," say the operators at the plant in question.

Keeping Chutes Clear

Chutes delivering coal to and from conveyors and elevators are an important item. Every operator knows how damp coal clogs chutes and causes coal to spill over or not run at all. Stainless steel is very effective in overcoming this difficulty. The fact that it stays smooth, wears evenly, has long life and does not rust accounts for its success. Sheets of 20-gage thickness, spot welded to the chute bottom, last a long time. This is the practice at one large plant that has a low maintenance cost.

Another plant uses a stainless-steel chute bottom for delivering coal from a centrifugal dryer to conveyor. Installed in 1938, this chute bottom is still in service. It wears smoothly and evenly whereas the carbon-steel chute for a companion dryer pits and wears unevenly.

Machine Drives, Protection

V-belt drives are the rule where direct connection of motor to equipment or gear reducer is ruled out. Except for the head shaft of certain elevators trains of open gears are being discarded. V-belt drives are efficient and long lived when properly lined up with equal tension on the individual belts. An experienced coal-plant engineer states: "If daily adjustment is made for the first week V-belts will give little trouble—but nobody does it."

V-belts are for short-center drives. One mine that tried a long-center high-speed drive had to go back to standard short centers. The flapping belts would turn over, tangle or run off the pulleys. At least twelve years of life has been noted in a coal washer, with the belts looking ready to repeat. The belt rating should be observed for successful operation.

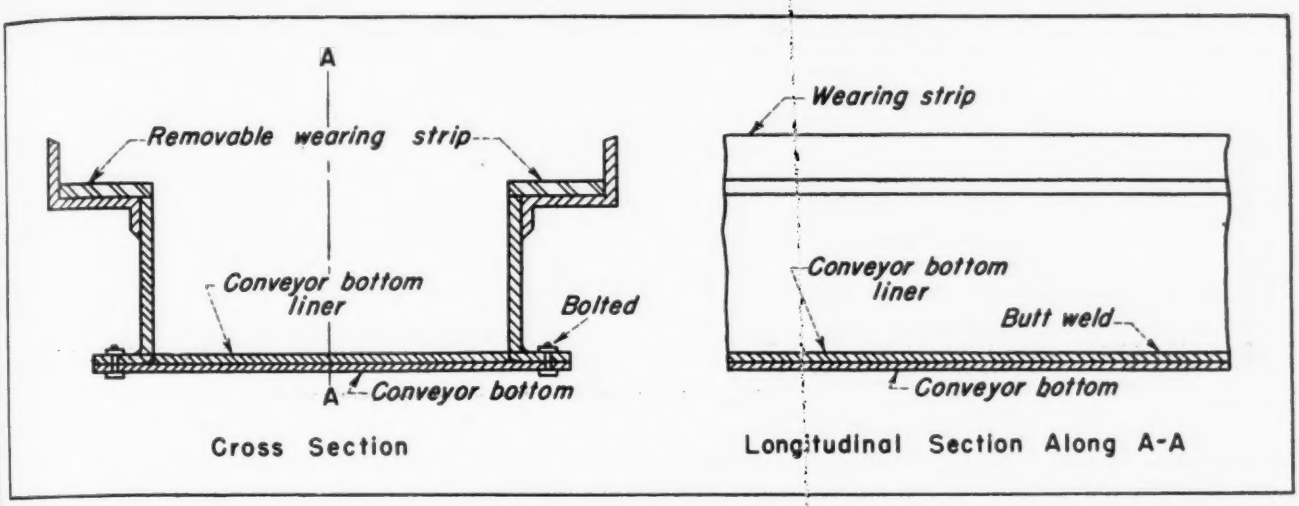
The totally inclosed splash-oiled gear reducers, which are much used for conveyor and other slow-moving equipment, are another reliable item. When trouble does come it usually is due to lack of oil. Gear reducers are very dependable. Outside of inspection and lubrication, maintenance is practically nil. Like other equipment, the load rating should be observed.

Gear-motors find many washery applications. The only trouble noted has come from overloads. They have now been on the market long enough so that factory recommendations are safe to follow. Gear-motors deserve wider use from a safety viewpoint and for economy of space.

Variable speed drives find applications around coal washers for driving stokers, conveyors, elevators and feeders. Most are not more than 5 to 10 hp. They give no trouble and require only occasional belt renewals where belts are used.

Soft pinions have been applied to elevator and conveyor drives in a few washers. These offer two advantages. The life of the mating gear is much longer. Noise from that pair of gears is eliminated. These soft pinions often outlast the metal pinions they replace. Different claims are made for the various materials from which these pinions are made. Those made of cotton or fiber are better than rawhide, which has many disadvantages.

The question of noise is worth considering. A quiet plant makes for safety. Where conversation can be carried on without shouting, signals and warnings may be heard and potential accidents headed off.



Two points about this conveyor are important: the removable wearing strips for the chain to ride on and the design of the bottom. The wearing strips need no explanation. The bottom is bolted on to make removal and replacement of the liner easy. The ends of the liners are butt-welded together to keep them from curling up and being caught by the flights. Plow bolts were a failure for holding the liners. As the heads wore, they pulled through the sheet and were ripped out by passing flights. The liner is spot-welded in place, making it easy to replace.

Tramp iron and pyrite lenses, which are almost as hard as iron, are an everyday occurrence in most washeries. Conveyors may be stalled or crushers broken. To protect machines that may be subject to continuous or stall overloads, various relief means are employed. Since fuses are pretty well outlawed, overload devices in the motor control are relied on except for certain applications. Numerous operators have been asked if such overload protection is successful. The replies have all been that it is. Normally this protection consists of a circuit breaker that opens instantaneously on short-circuit and a contactor controlled by a heater element to open on sustained overloads.

The usual exception is the crusher, sometimes equipped with a fly-wheel, which must have instantaneous relief. Shear pins of wood are the usual answer. One or more, about 1¼ in. in diameter, may be the set-up. One washery decided that conveyors should have similar protection but worked the idea out on a different basis. Instead of wood it employs a ¾-in. capscrew with a nut used as a through bolt. Since the conveyor loads are not all equal, these bolts are grooved to various standard depths to calibrate them to the different loads. An angle with suitable holes to rack several spare shear bolts is welded to the conveyor driving head. When an overload requires bolt replacement it takes only minutes, since the correct spares are within arm's reach.

Crushers, Dryers

Crushers do break, although rather infrequently. That is not to assume that they are difficult to keep in operation. The evidence is quite to the contrary. Maintenance usually is very light. The chief cause of broken crusher parts is pyrite, which is supposed to be removed ahead of the crusher but sometimes gets by. Protection is afforded by wooden shear pins, which give immediate relief from any flywheel effect except the rolls.

Maintenance Aids Crushers

The operator asks a good deal from a crusher, which the maintenance crew can help attain by proper adjustment and renewal of worn parts. A maximum of the size consist demanded, usually stoker, with a minimum of fines, is sought. That is what the maintenance men must try to keep within limits.

The reasons for drying coal are reduction in shipping cost and prevention of freezing in cold weather. There are two general types of drying equipment—mechanical and heat. There is considerable maintenance cost to the screens and some other parts of both types. The larger the coal the more wear on the screens. In heat dryers, ducts carrying moisture are subject to heavy corrosion in the presence of sulphur. Many plants operate dryers only in cold weather (about four months).

One type of centrifugal dryer operates at moderate speed. The coal size usually is under ⅜ in. Coarser coal wears the screens quite rapidly, partly from impact, where hard steels do not help so much. Records of screen wear vary considerably, as might be expected, since the hardness of coal and the refuse content vary greatly.

Wear of the several screen decks differs. One plant gets three to four weeks' life from the top deck, 1¼ mm., in hard service; second and third decks last two to three months. Other plants using the same type of dryers consider the screen life short without giving details. Perforated screen plates fail by breaking between the punched holes. A plant drying ⅜x0-in. coal gets a life of four months from screen plates. This same plant also gets four years' life from the lower roller bearing of one dryer and eight months from the other, possibly because of lack of balance. In the first plant mentioned the original upper bearings are still in use after six years of service. The over-all picture indicates a reasonable upkeep cost for this type of dryer.

Higher speed features a second type of centrifugal dryer. That may be the reason for the reports of shorter screen-plate life. In one plant the screen plates (¾-in. perforations) last 40 hours. It takes 2½ hours for two men to make a replacement. The screen is cone-shaped and, therefore, the sections of screen plate must be cut to fit. These are cut from rectangular commercial punched plates in the mine shop from a pattern worked out on the job. They fail by breaking out between the perforated holes.

Temperature Control Helps

Heat dryers used in coal preparation embrace several types. One is the rotary kiln. Another is the screen-type unit using a high-speed shaking screen to carry the coal through the hot-air zone. To control maintenance cost a basic principle is keeping the air temperature under 1,200 deg. F. Trying to force capacity by raising the temper-

ature makes trouble with screens and blowers. Blower wrecks have been caused by this practice.

Various types of stoker-fired furnaces use 1¼-in. or smaller coal. The coal feed often is regulated by variable-speed drives, which are very satisfactory. Beyond a belt now and then they require little attention. Pulverized coal supplied by hammer mills also is being used. Life of hammers in the grinding mill at one plant is put at four months, in comparison to five or six days for the same type of mill in a mine power plant. Fineness of grinding, the volume of coal put through and hardness of coal probably make the difference. Complete combustion of pulverized coal requires 80 or 90 percent to be ground to 200-mesh or less.

Control Life Good

In some plants heat control is by hand, in others it is automatic. Automatic controls on some recently installed plants are said to have given no trouble in the first two-year period, which is down to date.

One of the things to fail in some rotary dryers is the inner flue, which is exposed to hot gases on the inside and moist gases on the outside, the latter carrying any acid that may be picked up from the sulphur in the coal.

The chief concern about the maintenance of other types of heat dryers apparently is concentrated on the screen panels on which the coal travels through the heat zone. Various materials have been tried. Records indicate that stainless steel has the longest life of the usual screen materials. Screens are built in panel form so that they may be replaced easily or shifted in position.

As may be surmised, the "hot spot" is in the center of the hot-air flow. At this point the screen gets its worst abuse. A screen life of more than a year is reported by several washeries when the heat is properly controlled. One plant reports a two-year life in the hot spot when operating the dryer four months a year. Other sections have not been changed since the plant was installed—1941. In this plant the screen bars are narrow at the upper or wet end and wider at the lower, passing more air after some moisture has been removed. Still another plant switches the screen plates around to even the wear and get a good average life from all panels. By this means the screen panels in the hot section are moved out to the cool area and those in the cooler area are moved in to take their share of heat.

Roller-bearing eccentrics driving the screens in screen-type heat dryers give good life in this service. Replacements are rare. They are lubricated once a month.

Fans handling hot air sometimes are made of stainless steel for long life. In any case fan rotors should be repaired with steel at least as good as that of which they were built. War scarcity of correct materials and failure to use duplicate steel caused at least one bad fan wreck.

The maintenance of most dryers is not difficult if they are not overloaded and, to repeat, may be kept to a minimum by holding the air temperature under 1,200 deg. F. It is pertinent to repeat that the operating personnel can do much to keep plant failures within bounds and maintenance at a minimum. It is for this reason that operating problems are mentioned so frequently. Close cooperation between the two groups is mutually advantageous.

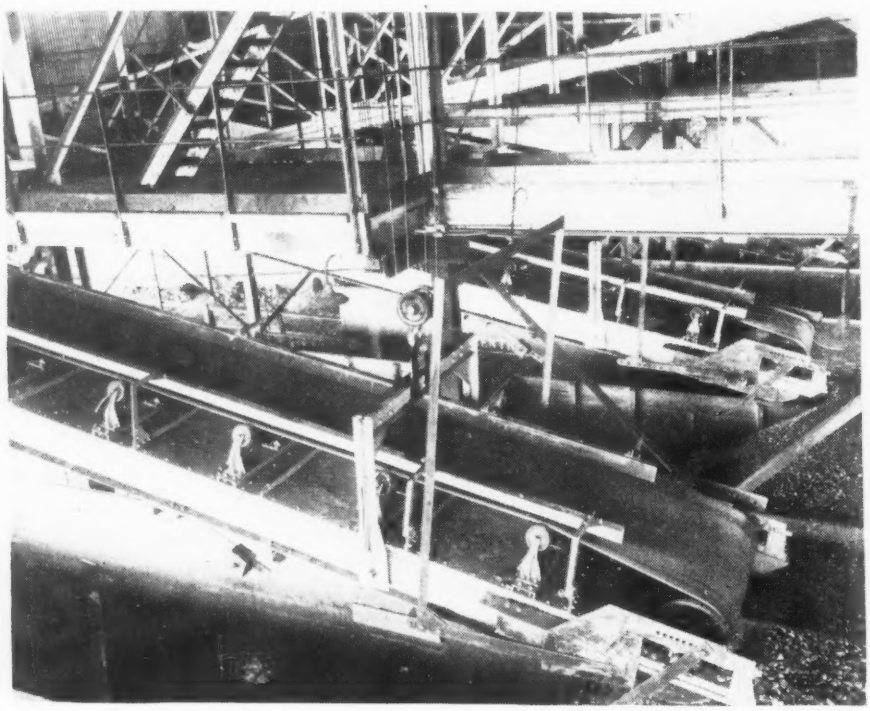
Oil-Treating Equipment

Actual maintenance of a properly installed oil-treating equipment, with its distributing lines, usually is a minor task. Its relation to other maintenance problems is where the worry for the operator comes in.

When the sprays are out in the open the drifting oil mist grabs floating coal dust and will "gum up" everything in reach—and its reach is considerable. That is one reason sprays are hooded. Hooding, however, usually is insufficient. There must be no flapping covers and no hood openings if the fog is to be confined. In some plants the spray nozzles are at the discharge end of the loading boom. In other installations they are at various points within the plant. The latter arrangement shortens the oil lines and does away with the need for flexible hose connections to the points where the oil is applied.

One clean arrangement is for household stoker coal only. The oil sprays are inside the centrifugal dryers. Thus, there are no openings where free oil mist can get into the air. So far as spray oil is concerned, the plant is clean. This is a very great advantage because floating fog and coal dust will clog up motors and blower heaters until very little air circulates. Such machines must be frequently washed with carbon tetrachloride and blown. They cannot be blown dry. Some heaters are scraped, washed and blown annually.

The more recent oil-treating systems continuously circulate oil at high pressure (140 lb. per square inch). Since high-viscosity oil or "oil and wax" will not spray unless hot, steam-heated kerosene is circulated in a parallel pipeline to keep the oil hot. Both pipelines are bound together and inclosed in a common insulating cover. With this system the kerosene pump is started several hours before work time, say at 3 a.m. By work time the oil is hot and liquid enough to produce a fog.



Rubber belts are growing in popularity in coal preparation. Proper care of belts themselves results in lives up to ten years or more.

MODIFIED LONGWALL
Cuts Top Trouble and Boosts Efficiency

Walls Equipped With Loading Machines Delivering to Chain Conveyors—Method First Proved by Two Years of Hand Loading—Adaptation Required Some Mechanical Changes in the Cutters and Loaders Used

By J. H. EDWARDS
Associate Editor, Coal Age

UNDERGROUND efficiency has been increased and uncertainty reduced by abandoning conventional room methods in favor of modified longwall at Totz mine of the Harlan Central Coal Co., at Totz, Harlan County, Ky. The natural difficulties are heavy cover and a very weak roof "from the coal on up." Walls 500 to 600 ft. in length are worked with mobile loaders and chain conveyors.

This mine, producing 850 tons per day, is a drift operation at tipple height in the Harlan seam. Coal thickness averages 42 in. and there are numerous local grades up to 10 per-

Tipple of the Harlan Central Coal Co. Totz mine is doing better since modified longwall was substituted for room work.

This illustration, looking along the wall from the mother-conveyor entry, was made before loading machines were applied. Position of the pan line and the method of cribbing were not changed. In the left foreground can be seen some of the 8-in. stratum of coal that is "burned" to the roof and does not "set down" with the rest of the cut.

cent. The acreage for the most part is a sort of basin lying at the edge of an area disturbed by the Pine Mountain fault. Cover ranges up to 2,500 ft. and is 2,200 ft. over the section where the underground photographs reproduced in this article were made. Location is on the Louisville & Nashville R.R., 14 miles from Harlan on the Poor Fork Branch, which goes through Cumberland and serves the mines of the United States Coal & Coke Co. at Lynch.

Character of the mine roof varies so widely that it defies accurate description. Weak shales are interlaced with rider coals and sandy bands. The highest falls—some 15 to 20 ft. on entries—have not revealed a strong stratum that could be described as a

main roof. Fortunately, the bottom is hard slate.

Underground operations were modernized in 1942 with the purchase of five Joy loaders (four 12BU and one 8BU), nine Jeffrey conveyors (two mother type and seven room type), two Jeffrey 6-ton cable-reel locomotives with controls suited to making them a tandem unit later, 75 Sanford-Day end-dump steel cars, a Cantrell portable air compressor and a 275-volt underground substation powered by an 8,500-ft. Anaconda rubber-insulated jute-protected cable carrying 4,000 volts and installed along the mine passageways.

Bad Top a Problem

The plan for room work was to use Joys for loading onto chain-type room conveyors. It was surmised that speed of working might reduce top difficulties as compared to those encountered in hand loading. Months of trial were disheartening. The faster advance helped but was not a cure-all for the bad top. In the limited height no timbering methods could be devised that were practicable in holding the top at the face over the open space required for manipulation of the loader.

Two years ago C. V. Bennett, president, changed the mining system to modified longwall. The walls were worked by hand loading onto the chain conveyors, and for the time being the loading machines were confined to development, including driving the butt-offs ready for installing the face conveyors for starting new walls. The 8BU loader was sold.

Top control having been proved successful by nearly two years of hand loading on the walls, the possibility of installing the Joy loaders on them was investigated. Beginning in August, 1945, two were put to this use. Within a month all four were working on the walls. The hand loading, because of the lack of machines, necessarily had to revert to hand work.

Tonnage per manshift from the walls, of course, has been greatly increased, although experience as yet is not sufficient to give a clear picture of what a long-term average will be.

One loading machine and one undercutter are used on each wing of the "T" and both work outward. This necessitated changing the controls of one loader to the opposite side and reversing the chain and sprocket of one cutter. The same changes were necessary on the machinery for the other modified "T" longwall.

No greater clearance between cribs and face is required than in hand loading. The cutting machines and loading machines sometimes pass at the end where one can back around the end of the conveyor out of the way. Usually, however, the loading machine, when moving back light to the center of the "T," must pass the cutter at some point as it is making its cut out from the center. In those cases the cutter bar is pulled out of the cut and the machine is parked lengthwise tight against the face. The loader then has just room enough to pass between the chain conveyor and the cutter.

Wall conveyor units consist of two 61AM wall or wing conveyors, each 250 to 300 ft. long, delivering to a 61AM mother conveyor. The latter is started with a length of 300 ft. and is successively shortened to 150 ft. as the wall face retreats. From this mother conveyor the coal is carried across through a crosscut and elevated to the mine cars by a 61EW conveyor. Car spotting is done with a Brown-Fayro hoist installed near the loading point and pulling the trip inby by means of a head sheave anchored near the wall line. When a conveyor trip has been completely loaded the locomotive is clear of the switch and ready to go out.

Moves Made at 150 Ft.

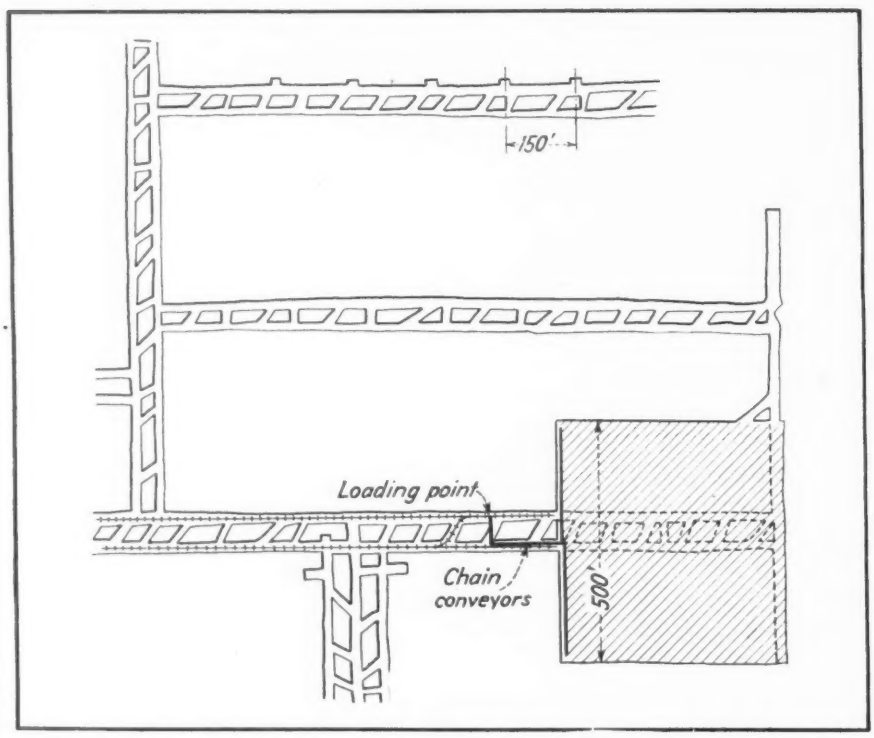
Ten-car trips, 150 ft. long, are loaded. Thus when the face of the wall is mined back to within 150 ft. of the car-loading point, the cross conveyor must be moved to another crosscut 150 ft. outby. At the same time the mother conveyor drive is moved and the conveyor again lengthened to 300 ft. Crosscuts are on 75-ft. centers, one on a 45-deg. angle and the next (for the elevator) on 90-deg.

Cutting on the walls is done with Goodman shortwall machines with 6½-ft. cutter bars. One makes a 5-in. kerf and the others 6-in. The thicker kerf has been found more satisfactory because the coal always "sets down" after it is undercut and before the cut can be properly bugdusted to provide proper shooting clearance.

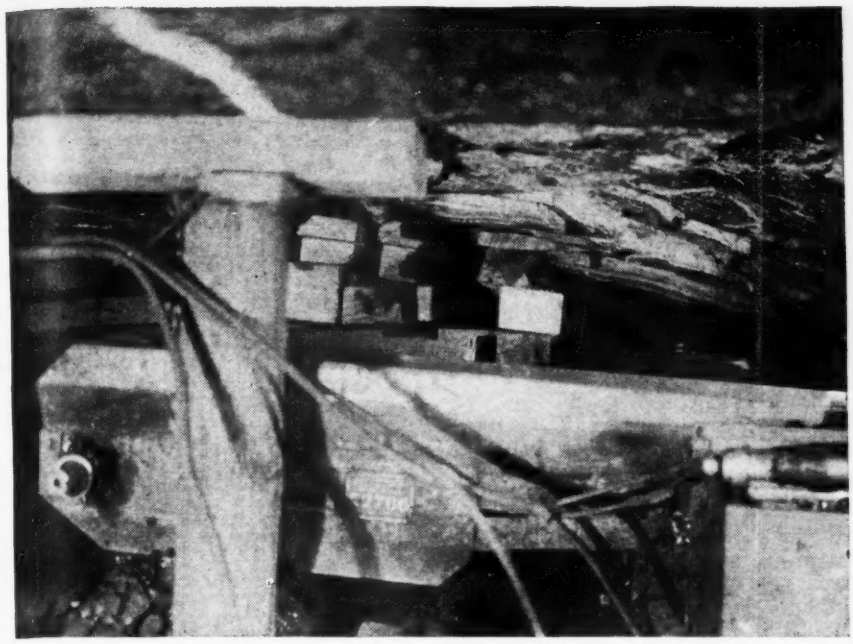
A skin-thickness parting 8 in. from the top introduces a mining difficulty because, for the most part, the 8 in. of coal at the top is burned to the roof and does not "set down" with the rest of the cut. With hand loading on the walls, the top coal had to be picked down by hand. The difficulty is not as great with mechanical loading. The coal that has "set down" is shot with du Pont "Lump Coal CC" by holes 8 ft. apart and loaded with 2½ sticks per hole.

On one wall still being worked by hand loading and nearing completion at the time the photographs were made no shooting was required because the roof weight was cracking the coal sufficiently. Spragging the cut to hold the coal up until shot has been tried without success.

Roof control on the wall is by hollow cribs in rows 6 ft. apart back of the conveyor, supplemented by steel



Section from the mine map showing two of the modified longwalls that replaced room work and improved roof control. Holes 150 ft. apart in a rib of the top entry are for the drive of an elevator that will replace the cross conveyor now in service in the lower entry.



Longwall conveyor discharging to the mother conveyor. The sagging top in the right background is indicative of what happened too often in room work.

These new facilities were completed in 1945. The commissary is at the left and the payroll and mine officials' offices are at the right. A lower story includes the doctor's office and a furniture-sales display room.

jacks and some wood posts, plus a row of safety posts, ahead of the conveyor. Individual cribs of a row are on 10-ft. centers and made of 4x6-in. or 6x6-in. stock. Standard practice is based on a crib 30 in. square. After initial success with that size 24-in.-square cribs were tried but quickly proved to be inadequate.

240 Tons by Hand

In the initial hand loading on the walls 30 men were employed on each 500- to 600-ft. total-length wall. The total included a boss and a brakeman and motorman for the service locomotive. A full crew usually delivered 240 tons to the main haulage sidetrack in a shift, making the output about 8 tons per manshift. The walls were worked one shift and the supplies were delivered to them during the night.

In driving double-heading entries with the Joys a seven-man crew averaged about 75 tons, and sometimes got 90 tons per shift. They were served by cable-reel locomotives.

Butt-offs for starting the walls are ventilated with Jeffrey blowers and du Pont "Ventube."

The new mine cars, which are 32 in. high and have body dimensions of 6x13½ ft., carry 2.7 tons—the average for Joy and conveyor loadings. Main-line rails are 60-lb., the inby rails are 40-lb.; total haul is now 2½ miles.

As indicated by the drawing, a supply track parallels the mother conveyor of a modified longwall unit. Conveyors are reversed and posts and crib pieces for the walls are conveyed to the back ends of the walls, except that the night crew unloads a limited minimum requirement along the walls. From the daily storage at the back end of the walls the timbers can be distributed during the loading shifts by loading them onto the conveyors during their normal operation of carrying coal.

On the entry that appears at the top of the drawing, "holes" in the rib are shown every 150 ft. These are part of a new plan to substitute a short elevator for the cross conveyor. The holes provide space for the conveyor drive.

A new commissary and office building of brick construction was completed at the mine this year. It is on a hillside with the upper story opening to highway or ground level at the front and the lower story opening to a lower-grade ground level. An extension of the roof at the front forms a porch over the windows of the payroll office. The lower story is divided into five rooms, two of which serve as the doctor's offices and one each for the mine engineer's office, furniture display room and heating plant.

Failure to get promise of a satisfactory delivery date on a freight elevator for bringing groceries and other store items from the lower to the sales floor did not hold up completion long. The mine mechanics improvised an elevator from a tipple loading-boom hoist that performs with entire satisfaction. It is equipped with safety-limit stops.

Harry Bennett is vice president and Homer Bennett, secretary-treasurer and manager in charge of operations for the Harlan Central Coal Co. Both are sons of "C. V.," the president. They reside in Harlan but "C. V." makes his home at the mine. John S. Smith is general mine foreman, H. R. Hurt is mining engineer, and M. L. Coffey is chief electrician.

HAULAGE SAFETY

Promoted by Logic in Eliminating Hazards

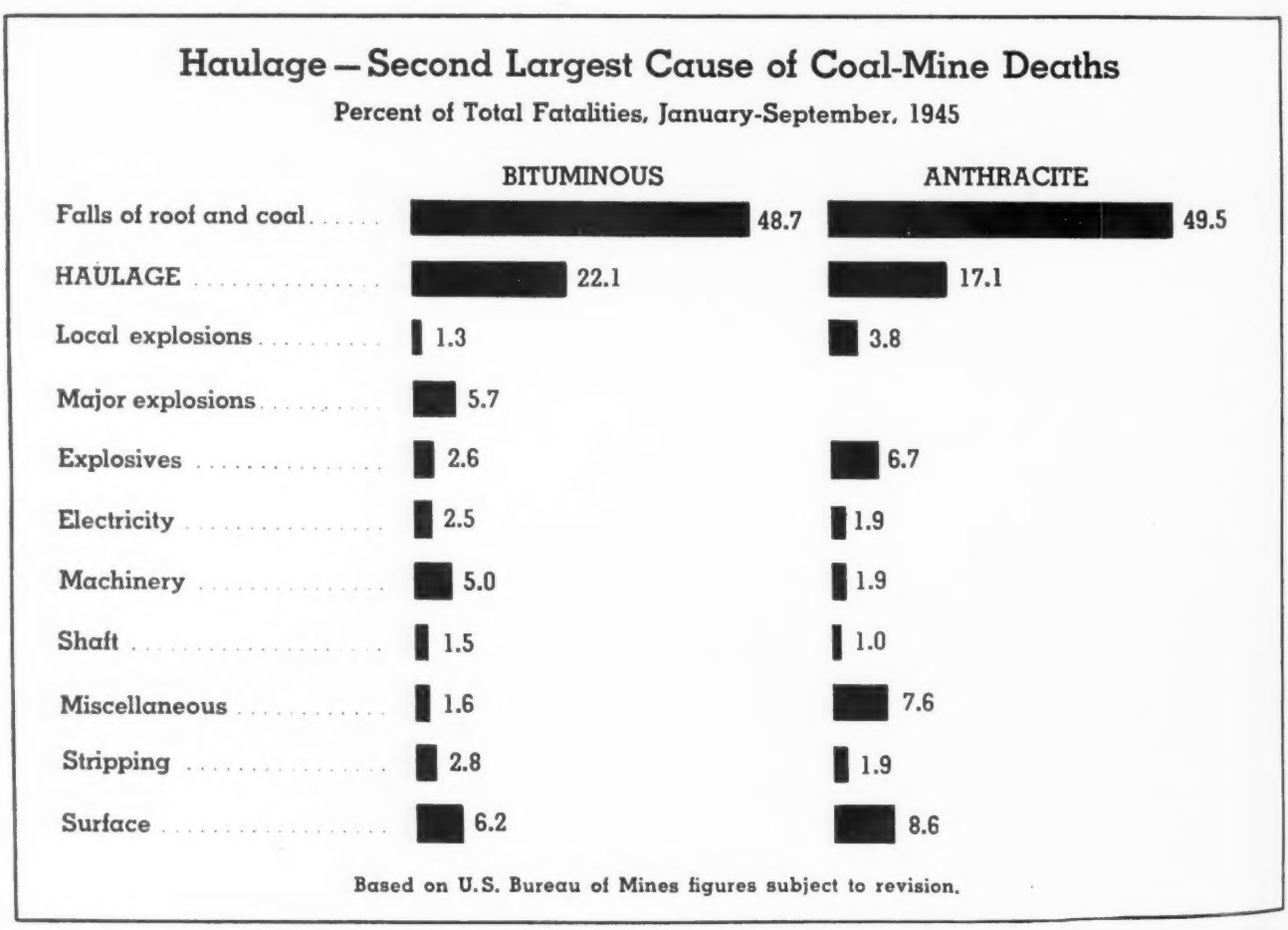
Safe Equipment, Safe Haulageways, Slopes and Shafts, Safe Practices and Safe Equipment and Accessories the Keys to Reduction in Haulage Accidents—Logic Shows the Way to Hazard Elimination

SAFE MINE HAULAGE is dependent upon perhaps four major factors:

1. Safe equipment.
2. Safe haulageways, slopes and shafts.
3. Safe practices.
4. Safe auxiliaries and accessories.

Since the results of unsafe shaft and hoisting equipment usually are immediate and spectacular, accidents in this operation are relatively fewer than in other phases of transportation, but they also can be more serious. When a man falls into a shaft or off a headframe, or a cage drops or is pulled up and dumped with men on it, the result is more often than not a fatality, or fatalities, plus serious injuries. Speed and travel limiters, safety dogs and bridle chains in good condition, safety platforms and railings, proper fencing of shafts and control of access to shafts by safety gates and attendants, bonnets, inclosed sides and handholds, good signaling equipment and regular inspection of rope and equipment condition are among the tested safety measures which yield results. Regular inspection of shaft timbering and condition, with particular attention to guides, is an added precaution, along with fireproofing and protection. It is assumed, of course, that the hoist, controls and overwind and speed-limiting accessories are maintained in safe condition, particularly the brakes, and that safe, experienced operators are employed.

Slopes, since they partake something of the nature of both level haulage roads and vertical shafts, offer some problems of their own. The possibility of rope breakage is present the same as in shaft hoisting and regular inspection is equally or more important. While a drag can be used in hoisting, it is very difficult in the lowering process to protect men and equipment against rope breakage or failure of a hoist part by devices similar to dogs.



Accounting for approximately one-fifth of the total, haulage is the second largest cause of injuries and fatalities in coal mining.

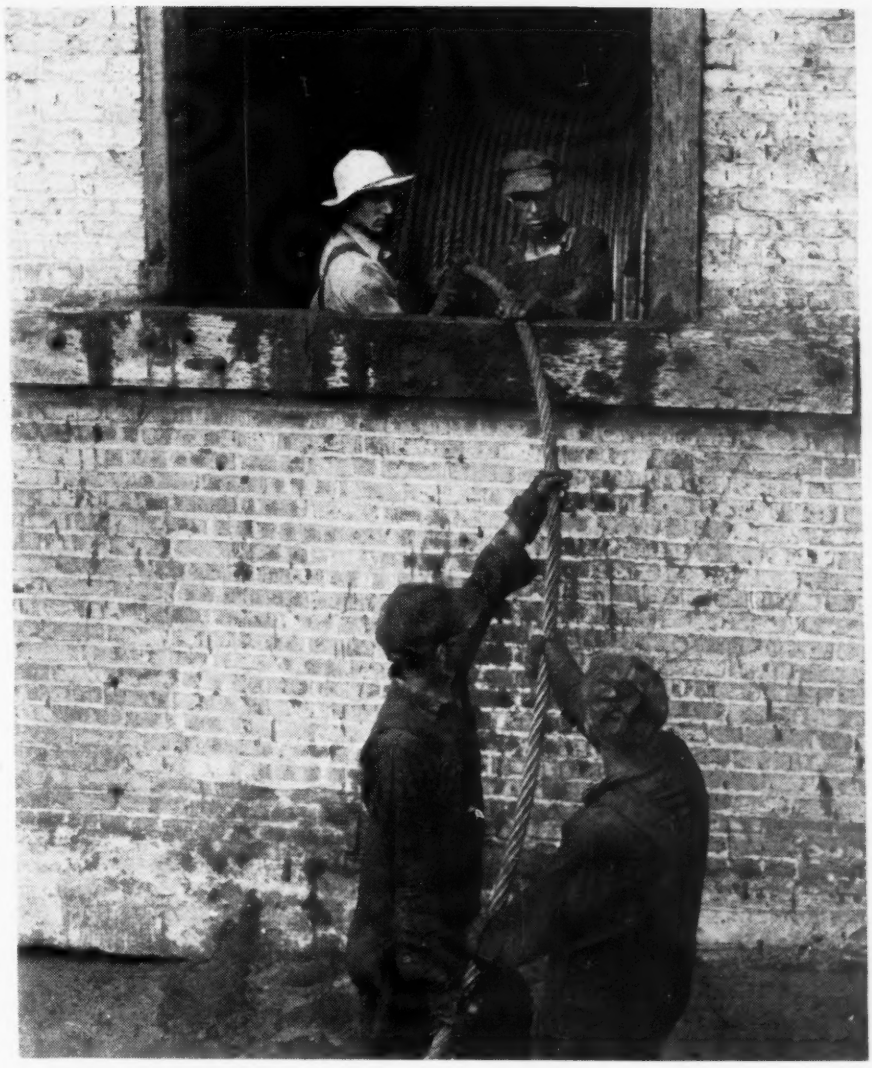
Consequently, rope and hoist condition become even more important. Equally vital is the condition of the coupling and the links and pins or other couplings on individual cars. Good steel or alloy links and pins are essential and regular annealing is a practice that pays dividends. No car with bent or cracked links or couplings should be used on a slope or, for that matter, anywhere in the mine. Safety catches on the pins and on the main couplings are used and recommended by many companies where slope hoisting is necessary. Swivel couplings on the end of the rope permit it to turn and thus relieve stresses due to twisting. Some companies find that provisions for lubricating such couplings by oil or a pressure fitting for grease keep them from binding and losing their capacity to turn, in addition to lengthening their life.

Promoting Slope Safety

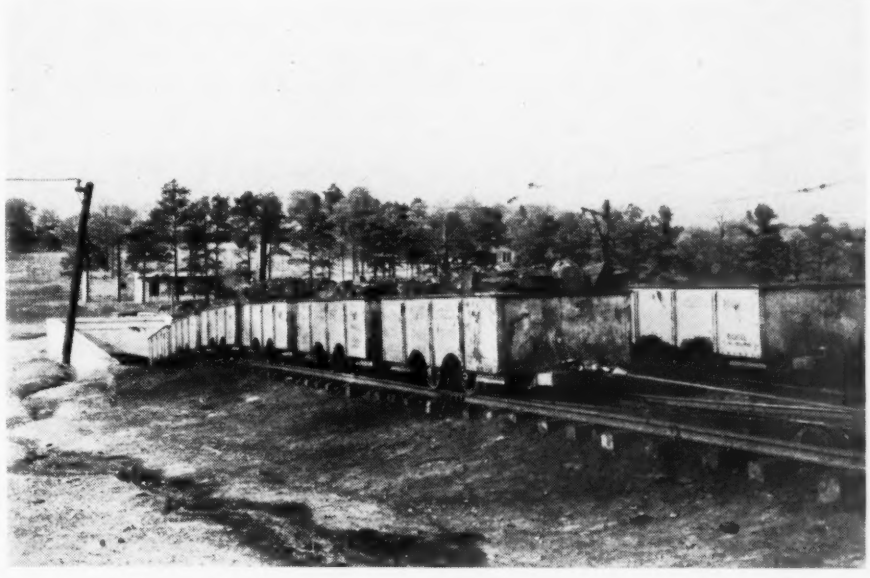
Since the hazard is greater when men are being lowered and hoisted in slopes, several companies have supplemented the regular hitchings and couplings with such things as a rope or chain clamped to the hoisting rope and then run back along or through the cars when hoisting men to keep the trip or part of the cars from running back if a pin or link should break. An automatically operated mechanical stop is recommended as an additional safeguard. One slope operation was successful in applying a drag that was held up during lowering by a rope run forward over the tops of the cars to the hoisting rope, the idea being that if the main rope broke the weight of the drag would pull it down into the ties and stop the trip. The same thing also would happen in hoisting. The rope also provides additional protection against the trip breaking in two.

In addition to coupling-pin and link breakage, slope track condition greatly influences safety results, since every derailment is a potential source of injury or fatality aside from damage to equipment, loss of tonnage and cost of restoring service. The best possible track is accepted as a major method of preventing slope haulage accidents. A system whereby the hoistman can be signaled from anywhere in the slope, preferably from the cars, also has been found to promote safety.

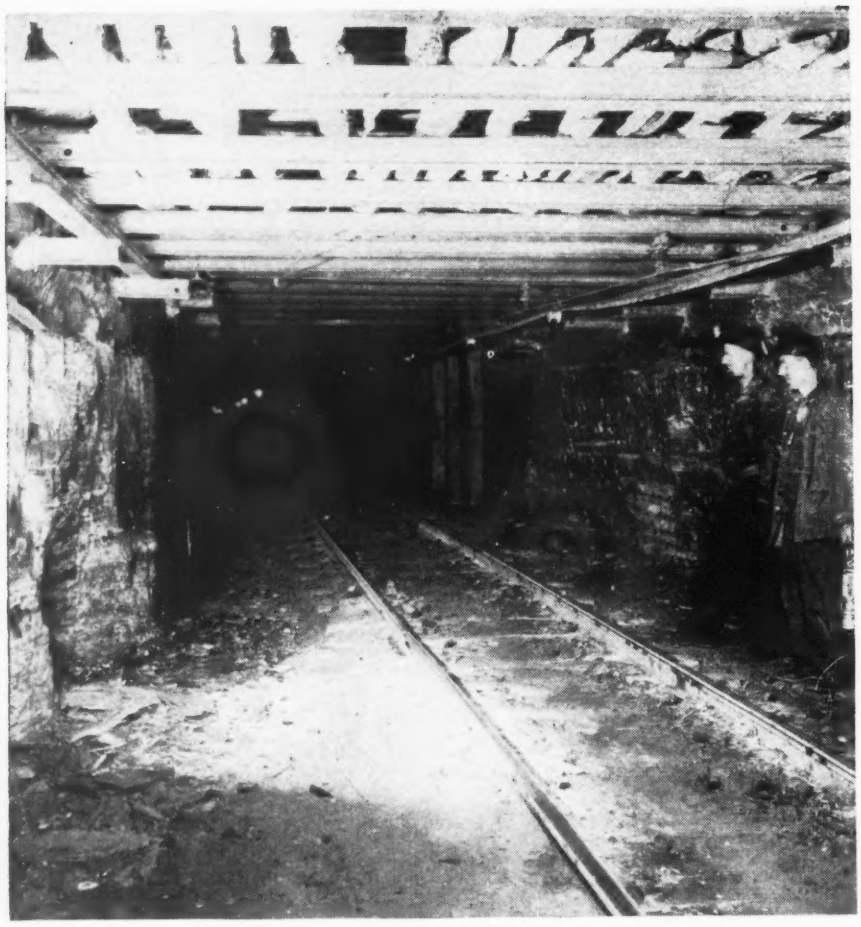
Slope injuries and fatalities are not alone the result of accidents with mantrips. Incidentally, it goes without saying that no men except those authorized should ride in or on cars except in mantrip cars. Runaway trips or cars striking men on the bottom or



Rope, hoist, cage and shaft conditions are among the critical factors in preventing shaft accidents. Ropes, fittings, dogs and other facilities should be inspected regularly, and replaced, rebuilt or overhauled as necessary.



Good track, good equipment and good couplings and hitchings, annealed and maintained as necessary, are among the steps promoting safety in slope hoisting. Drags reduce runaways in case of rope or hitching breakage or other accident.



Clean, well-laid track with good roof support and plenty of clearance increase safety in trip operation. Hitching crossbars into the ribs eliminates legs that might be knocked out and at the same time increases clearance.

traveling along slopes is another hazard in slope hoisting. When a separate manway is not available and men, except those engaged in work on track or other slope facilities, who should be properly safeguarded, must travel in slopes, a separate compartment in the slope railed, fenced or walled off from the track and belt (if used) should be provided. Bridges, subways or other facilities should be installed so that men are not required to cross slope tracks or belts.

Derails or trip stops are accepted means of preventing runaway cars or trips from entering slopes or from running down them to the bottom if they break loose in hoisting or lowering. Every supply or service track leading into a slope should be protected by a permanent derail or stop, and some companies have found derails on the main coal track or tracks a paying step, even where it is necessary to keep a man present to operate them. The development of modern remotely controlled electric switchthrowers often makes it possible, however, to provide such protection without keeping a man at each station along regular coal-handling tracks.

Haulage on the level presents some of the problems of slope haulage and in addition includes a number of its own. From the safety standpoint injuries or fatalities may result, among other things, from the following:

1. Moving trips or equipment striking, squeezing or rolling men.

2. Men falling off cars or locomotives or attempting to jump on or off, or striking timbers, wire and other objects while riding.

3. Coupling, pushing and handling cars, locomotives and other transportation equipment.

4. Collisions between trips, cars or locomotives and other equipment, doors, roof falls, material and other obstructions.

5. Derailments.

Shock or burns from electrical equipment or stray currents and injuries from materials, tools or equipment carried in the same cars with men are others in the list. Stating the causes indicates the remedies, which include the following:

1. Prevention of runaways involving cars, locomotives or trips.

2. Use of car stops, derails and other facilities to keep runaway equipment from entering or approaching places where men are working.

3. Adequate clearances and shelter holes, or at least the former.

4. Provisions for keeping all but necessary men off haulage roads.

5. Locomotives, cars and other rolling stock in tip-top condition, meaning also that it is in the safest condition possible with its design.

6. Incorporation of all possible safety provisions in new equipment, such as anti-climbing guards on locomotives, safe quarters for tripriders on locomotives and automatic couplers on cars. Where possible to do so, these and other features should be incorporated in existing equipment to promote safer operation.

7. The best possible roadbed, track and timbering.

8. Good lighting along haulage roads and elimination of all possible obstructions to vision, such as doors, curtains and other structures unless they can be supplied with windows.

9. Control of haulage through dispatching, block signals or other means to prevent head-on, rear-end or side collisions, and use of trip lamps and other warning devices on moving or standing trips or cars.

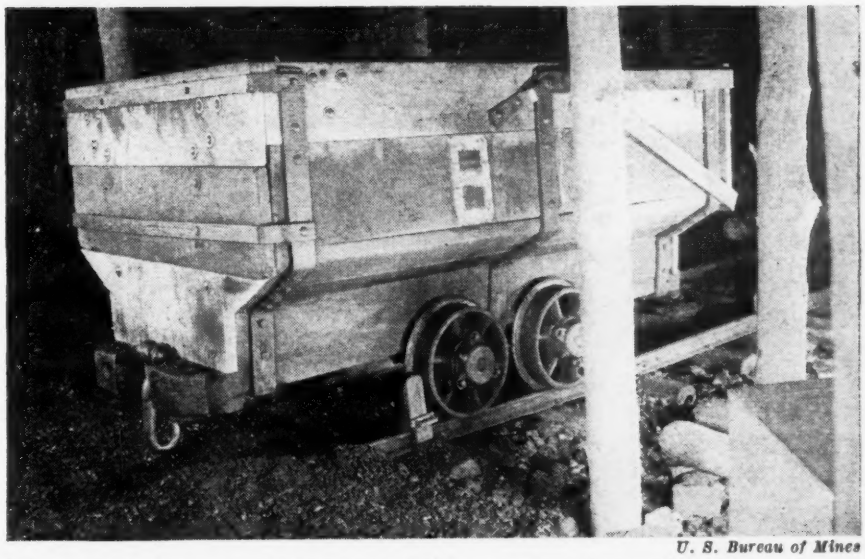
10. Safe operating practices to prevent injuries to men.

The preceding list is easily expanded and several of the items are closely related, meaning that the adoption of one safety measure also takes care of a hazard of another type. Tip-top equipment condition not only prevents derailments but brakes, links and pins in good order also reduce the possibility of runaways due to brake failure or loss of part of the cars in a trip. Prevention of breakage of trips also acts to reduce the possibility of collisions due to trips or locomotives running into stray cars on the track, while certain types of signals show the presence of stray cars to following trips, etc.

Runaways are not limited to complete trips. A car that breaks loose while being loaded and catches a man at the face is just as much of a runaway as a big trip with locomotive out of control on a hill and quite often is more likely to result in a bad injury or fatality. The remedy is simple and involves only a block of ties or timbers or the use of a car-stop, wheel-lock or other similar device in addition to the brakes. To prevent the car, in case the grade is down from the face, from running the other way, the holding

device is shifted to the other side, or a derail may be installed to throw the car off the rails and thus prevent it from running out on the main line.

Cars running or being pushed into a room are another contingency. A derail or stop is one of the simpler ways of preventing such an accident and supplements the general practice of aligning the switch against the place except when a change is being made. In mechanical loading, of course, some of these factors are not present because the cars are coupled to the locomotive, except when they are switched to the storage track or parting. Such tracks or partings, and other storage tracks or partings, also should be protected by stops, blocks or derails. Carrying out the idea, derails at the mouths of all room entries are a further safeguard against runaways in case the grade would permit equipment to roll in that direction.



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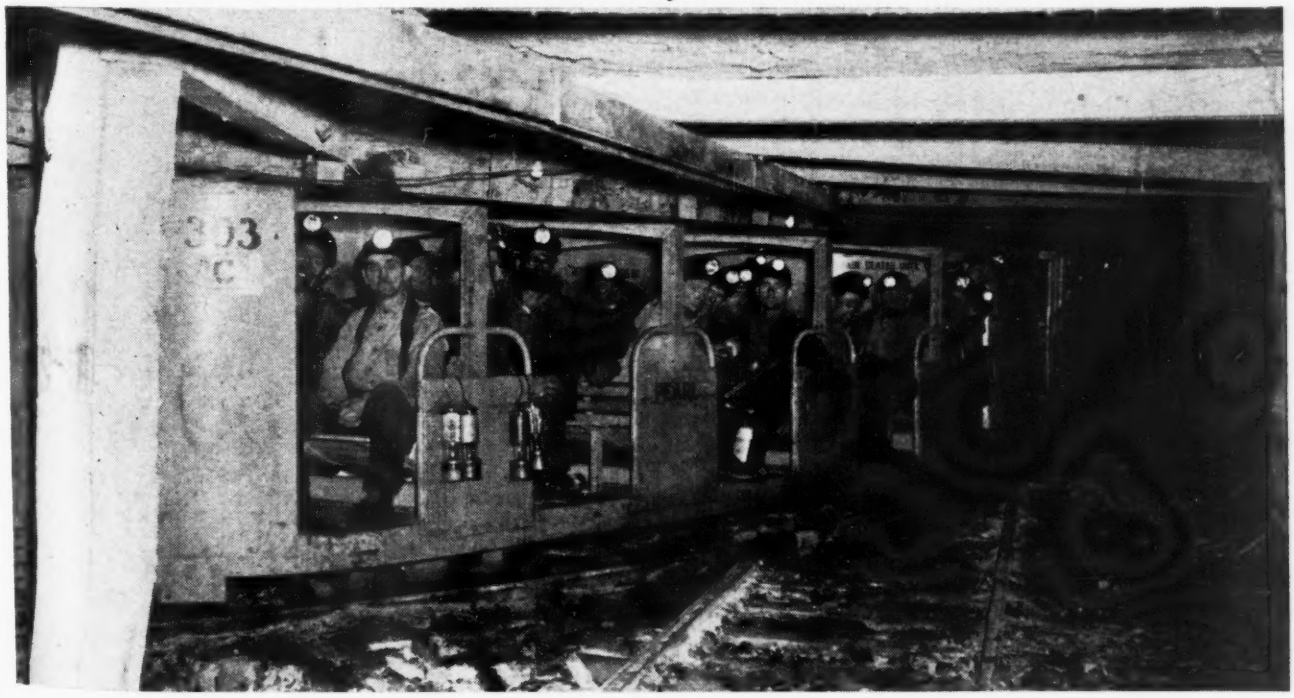
Life savers at the face and elsewhere. Safety car stops, dogs and similar equipment prevent runaways and thus eliminate injury, loss of life and damage to equipment.

Good Equipment Helps

Runaway protection, therefore, involves good equipment condition and means such as derails, blocks and stops to keep cars from starting to run or, if they should start, to stop them or throw them off the track before they get too far. With these principles in mind, the matter of protection then becomes a matter of logic when the grades are known.

Something further might be said on the subject of trip runaways during movement by locomotives. These result from failure of locomotive brakes or parts, faulty car brakes, insufficient sprags, and trips too big for the locomotives. Stating the cause indicates the remedy, although a number of operators with heavy grades in favor of the loads supplement other precautions with skids, which are classed as more reliable and may permit operation without sliding and flattening car wheels by spragging or setting the brakes to maximum tightness. Several methods of removing skids automatically have been devised, two of which have been published in recent issues of *Coal Age* (February, 1945, p. 136; May, 1945, p. 126).

Clearance figures in a large proportion of haulage injuries and, therefore, is a matter of greatest importance in their elimination. Much could be said on the subject, but it boils down to the fact that sufficient space should be provided on at least one side of all openings carrying track (including rooms) so that a man has ample room to pass a trip or car or let it pass him. If conditions permit driving openings wide enough or setting timbers back, clearance on both sides is an additional safeguard. If room necks, crosscuts and other openings are not available at the proper distances, shelter holes are recommended for men who must use the haulway. These holes



Special cars such as these are being more and more used for greater safety in transporting men underground.

A code of safe practices, strictly enforced, reduces haulage injuries by preventing such practices as that shown here: attempting to couple from the inside of the curve.

should be wide enough and deep enough to provide reasonable protection, should be marked and should be kept clear of obstructions.

Vertical clearance is just as important as horizontal although somewhat more difficult to provide where the coal is thin. The rule should be, however, to provide all that may be necessary, including an allowance for any timbering that may be required later.

Clearance, as stated, is a major factor in reducing haulage injuries, but if men are kept off the haulage road they cannot be struck. Separate manways, therefore, are being provided where possible at a growing number of installations, along with overhead crossings or subways where it is necessary for men to cross tracks, especially in any numbers. If they do use the track level, a railing that forces them to stop, change direction and look before stepping out has been found helpful at a number of operations.

Making Old Units Safer

Good equipment in good condition means, as already intimated, fewer injuries. Even though its design from the safety standpoint may not be of the best, brakes, wheels, couplings and other items in good condition mean safer operation and higher efficiency. Old equipment may be supplemented with some of the newer safety provisions, and all new equipment should have such items as anti-climbing bumpers, hydraulic pole shifters, good quarters for motormen and snappers, automatic couplings and other safety auxiliaries, including rerailers or jacks on every locomotive or other unit.

Mantrips are regarded by many as requiring special cars since a large number of men are concentrated in a few cars, with consequent increase in number subject to injury in case of an accident. Consequently, the trend is toward specially designed mantrip cars that are comfortable, easier to handle and provide additional protection against all hazards up to and including derailments, collision, roof falls and electricity.

Good track is every bit as important as good equipment in preventing haulage accidents, especially if kept clean, dry and well maintained. The old adage that something may happen, such as a derailment, a number of times without serious consequences but that eventually an injury will result, is true here also. So every incident in haulage should be reported and corrective steps taken immediately. Good track, of course, includes throws on every turnout; blocking of frogs, switch throats, guard rails, derails, etc. to keep men from catching their feet; concreting or flooring of switches for this and other purposes; switch-position indicators and other auxiliaries.

Roof support has much to do with the safety and efficiency of haulage. The criteria are freedom from obstruction, strength to hold the material and permanence. Legs take up space that otherwise could be devoted to clearance and are subject to being knocked out, often with disastrous results. Hitch-drill or similar timbering, therefore, is finding increasing preference, along with sand-cement coatings and other methods leaving the heading or gangway clear all round, or at least on the ribs.

Ability to see often means the difference between opportunity to stop or get out of the way of injury. The answer is good lighting on haulage roads and good lights, including warning or marker lights, on locomotives and other equipment. Vision also makes logical windows in doors and removal of all other possible obstructions to sight.

Where several motormen are turned loose to go it alone, along with men tramming or moving other equipment, the result almost inevitably is collisions. And, failing indoctrination with the safety idea, backed up by discipline when necessary, wild motormen have been known to ram doors and indulge in other equally dangerous practices. One answer is control of trips through dispatching, installation of signal systems that automatically keep motormen off sections of track where other equipment is operating, use of warning lights or other signals on equipment, automatic doors, and similar steps. Signals may be supplemented, as at some operations (Coal Age, January, 1940), by special electrical systems warning motormen of material on the rails or cars broken loose from trips on the track around curves, at the bottom of hills, etc.

Safety Code Helps

The preceding comments by no means exhaust the subject of physical aids to haulage safety. It also would be possible to write reams on operating practices designed to prevent injury and loss of life. It might be said, however, that drawing up a code of safe practices and drilling it into the heads of employees is a real step toward the desired goal. Codes will differ somewhat with equipment and conditions, but logic and experience quickly show what should go into them, the same as it shows what physical safeguards should be installed. However, the code should include at least two rules, in addition to the many others that might be named, these rules prohibiting jumping on or off moving equipment and coupling cars while in motion. On coupling, incidentally, pins now have been designed with rubber handles (Coal Age, October, 1944) to reduce the possibility of hand and finger injuries. A third rule should require use of car stops or blocks at the working faces especially and, with derails, at other points where runaways might occur. As stated, logic and experience show what other rules should be adopted and enforced to supplement physical safeguards in achieving a higher degree of safety in mine haulage.

MINING IN EUROPE:

Wartime Coal Production and Utilization

Damage to Mining Plants Relatively Small—Low-Ash Coal for Liquid Fuel and Electrodes a Major Goal in Germany—Froth Flotation Used Widely in Western Europe to Supplement Jigs and Special Equipment

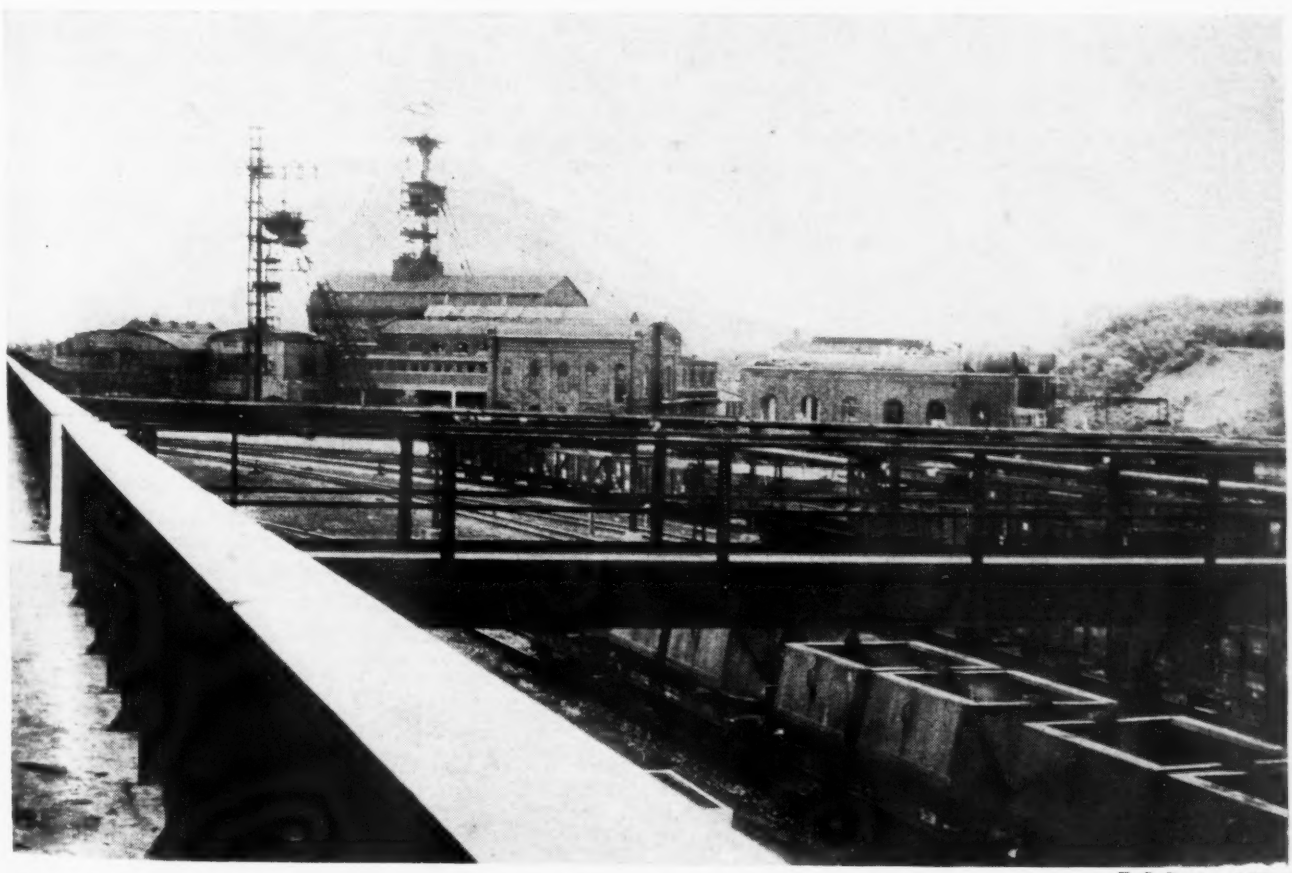
By H. F. YANCEY
Supervising Engineer
Northwest Experiment Station
U. S. Bureau of Mines
Seattle, Wash.

BOMB DAMAGE to the surface plants at the mines in Germany during the war was not serious, although many of them suffered incidental hits because of proximity to high-priority targets. The substantial construction of surface plants tended to minimize damage from near misses. Many mines, however, could not have operated after surrender even had other essentials been available, because of lack of railroad transportation facilities—a No. 1 target of the Allied armies. In general, the open-pit brown-coal mines suffered less than the underground operations.

In the Ruhr coal basin—the heart of the industrial and war-making economy of Germany—the coal mines were damaged more than in the Saar, due in part to the fanatical resistance of the German army divisions caught in the Ruhr pocket and in part to the presence there of more closely integrated war-materiel plants making products ranging from combat weapons to synthetic liquid fuel, all based on coal. The coal mines of France, Holland and Belgium suffered principally during the occupation by the Germans from the inordinate wear of machinery caused by the poor quality of the lubricants and the high level of production that was maintained. Also, as the Germans evacuated the properties in the face of the Allied drive they looted the mines of small equipment and tools.

Prisoners Employed

To maintain production in the French mines during the war the Germans lengthened the working day, put prisoners of war (mainly Russians) underground, and reduced develop-



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German mines, such as Zollverein 1 and 2, Gelsenkirchen Bergwerke, A. G., shown here, suffered relatively little damage from bombing and other activities during the war.

TABLE I—Bituminous Coal-Mining Methods in Germany in 1943.

	Percent			
	Cut by Machine	Mined by Mechanical Pick	Shot Off Solid	Mined by Hand
Ruhr	10.6	82.8	6.6	...
Saar	45.6	50.9	3.4	0.1
Aachen	0.6	98.6	0.8	...
Upper Silesia	30.4	12.0	56.9	0.7
Lower Silesia	12.7	75.8	11.2	0.3
Saxony	16.9	77.8	5.1	0.2
Sudeten	14.5	58.5	21.7	5.3

ment work. An incentive pay increase of 10 percent was given to workers who were not absent in a 15-day pay period. Absence exceeding three days made the worker liable to deportation to Germany. Strikes were stopped by arresting one man in ten, to be held hostage and shot if work was not resumed within two hours.

In Holland the Germans did not destroy the mining properties when they were forced to evacuate but they carried away small equipment and tools. Poor lubrication and neglect of repairs and replacements necessarily caused rapid wear of machinery. Nevertheless, in May, 1945, the daily production of the twelve mines in the South Limburg field was 15,000 tons, compared to a normal of 45,000 tons. At that time food was very scarce in Holland, and although the Dutch miner received about 4,000 calories per day he had to share this with his family. Even this situation was considerably better than that in the Saar, where the miners were getting 1,000 to 1,500 calories, consisting mainly of potatoes and bread.

Liquid Fuels Major Goal

During the war the whole fuel economy of Germany was geared to the production of liquid fuels. Pitch coke for electrodes could not be made from the heavy fractions of coal tar even though electrode carbon was essential, because these fractions could be hydrogenated to yield motor fuel. Only for making carbon black for rubber tires could anthracene and naphthalene be spared. As transportation was the key, solid fuels had to be utilized wherever possible for other than military vehicles. Carbonized coal briquets, low-temperature coke, charcoal and wood, both dry and green, were used as fuel for trucks equipped with gas generators. Passenger automobiles in essential service and some trucks carried cylinders of compressed or liquefied gases. From an abandoned mine in the Saar, for example, enough methane was obtained to maintain a service-station system, selling it compressed in cylinders. A non-military gasoline-fueled truck was rarely seen on the Continent. An occasional passenger car in England was equipped with a "feather bed" holder on its top for storing coke-oven or other gas.

Of the solid fuels, carbon in the form of coke, without which metals could not be reduced from their ores, was preeminent. Where the specifications for metal production required it, as in the case of aluminum, ashless coal was prepared by dissolving it in solvents and filtering off the ash by the Pott-Broche process, known and unused before the war but expanded at a plant in the Ruhr to the extent of treating several thousand tons of coal a month.

The Krupp-Lurgi process of low-temperature carbonization, which, of course, gave a high yield of liquid products for marine fuel and reactive coke for automotive gas producers, was employed both in the Ruhr at Welheim and at the Velsen mine in the Saar. This latter plant comprised 96 small slot-typed ovens and was operated from 1942 until its capture in March, 1945. That the plant was successful under the war economy of Germany is indicated by the fact that its capacity was being doubled at the time of capture.

Cheap oxygen made by the Linde-Frankl process was used to gasify coke and carbonized brown-coal briquets, the gas being used to synthesize liquid fuels for industrial purposes and town gas. By employing oxygen under pressure in the generator, gas of high calorific value was made without the use of needed liquid fuels to enrich it.

Supercoal Research

At the beginning of the war in 1939 research on coal pertaining to preparation, cleaning-plant control and carbonization was consolidated under the name of Verein fuer die Bergbaulichen Interessen. Dr. F. L. Kuehlwein directed the work on new-process development and Dr. Herman Meyer was responsible for cleaning-plant control in the Ruhr. The principal war problem given this group was the development of processes that would yield coal of a very low ash content. Coal containing two to three percent ash was needed for making synthetic liquid fuels by the Bergius hydrogenation process, and coal containing about 0.5 percent ash was required for electrodes inasmuch as coal-tar pitch was converted into liquid fuels and hence was not available for this purpose.

Special Plant Built

The outcome of this research was the improvement of existing washeries to prepare coal for hydrogenation and the construction of a special cleaning plant at the Queen Elizabeth mine in Essen to prepare supercoal for electrode carbon, principally for aluminum reduction plants. At this plant a heavy-medium separation was made in a magnetite suspension kept as free as possible from eddy currents. The Germans called this newly developed process the "Laminarstrom." Magnetite of the required fineness was suspended in water in trough-shaped units about 45 ft. long. Coal sized 10 to 5 mm. and 5 to 1 mm. was fed in at one end and was allowed to settle to its equivalent density in the magnetite suspension. At the discharge end of the trough splitters were arranged horizontally to make four products successively increasing in ash content. The cleanest of these, containing 1.5 percent ash, was crushed to a fineness of 30 percent passing 10 microns and the whole was recleaned by froth flotation. The cleaned froth containing 0.5 percent ash was mixed with pitch and coked in ordinary slot-type ovens for subsequent manufacture into carbon electrodes. The magnetite separation was made first to remove fusain and durain because the flotation process was considered incapable of removing these components.

This plant operated 15 months during the war but was rendered inoperative from damage to other parts of the same unit in an Allied bombing raid in March, 1954. It was planned to treat coal finer than 1 mm. electrostatically, and a plant comprising six such units adjoining the magnetite plant was under construction when the bombing took place.

Another process used to make supercoal for electrodes in the Aachen area at the Carl Alexander Works involved froth flotation and further extraction of the mineral impurities from the

cleaned froth with a mixture of hydrofluoric and hydrochloric acids.

German Coal Mining

Table I shows the mining methods employed in the various bituminous coal districts of Germany in 1943, classified according to the way the coal is broken free at the face. It will be noted that over 80 percent of the Ruhr coal, which is very friable, was mined by mechanical picks. In the Aachen area, where the production is, of course, smaller, this figure reached 98.6 percent, while in the Saar it was only 51 percent. Lt. Col. G. C. Branner, U. S. Army, in charge of the National Statistical Office at Essen, courteously supplied these figures.

At one of the large mines in the Ruhr, the Albert Voegler Zollverein, it was interesting to see on a blackboard in the hoisting room that their normal production goal of 10,000 tons was compared with that of the New Orient mine, in Illinois. Of twelve important coal beds three are being mined actively. The deepest is 1,800 ft. below the surface and the thinnest that had been mined was 18 in. Cars are hoisted in balance on two four-deck cages. Underground haulage is largely by compressed-air locomotives carrying an initial pressure of 3,000 lb., although trolley units are used.

One side of the washing plant at this property is used for cleaning medium-volatile coal and the other for high-volatile coal, each at a rate of 400 tons per hour. Two-compartment piston jigs are used and the coal is sized to 3x0.4 in. for one set of jigs and minus 0.4 for another set. The coarse coal is dewatered on shaker screens and the entire quantity of fines is thickened for cleaning by froth flotation. In this way no fine coal is lost. The raw coal to the washery contains about 20 percent ash; the washed coal, 6 to 7 percent ash and 1 to 1.2 percent sulphur; the refuse, 70 percent ash; and the middlings, which are burned in the boiler house, 30 percent ash. The size composition of a typical Ruhr run-of-mine coking coal is as follows: plus 3 in., 15 percent; 3x0.4 in., 20 percent; 0.4 in. x 1 mm., 50 percent; and minus 1 mm., 15 percent. The volatile content of the Ruhr coking coal usually is about 24 percent.

Coal Preparation

The characteristic difference from coal-washing practice in the United States is the wide use of the froth-flotation process in Germany for cleaning coal below 1 mm. or less in size. Virtually all washeries preparing coal for coking use flotation. In the Ruhr about 2,000,000 tons annually is so cleaned. The common reagent is middle oil distilled from coke-oven tar; 2 to 5 lb. of this fraction is used per ton of raw-coal feed. Mechanical-agitation flotation cells are the most common, although a few plants use pneumatic-type cells. Drum and leaf filters are used to dewater the froth.

The most common type of washing unit, both in the Ruhr and in the Saar, is the piston jig. Coal below 3 in. ordinarily is separated into three sizes and each size treated in different two-compartment piston jigs. This method of sizing before washing has been in use for many years. The float mechanism for controlling automatically the evacuation of refuse was improved about 10 years ago to match present practice in the United States, but for a different reason. This improvement was necessitated by the competition then of heavy-media processes such as the de Vooys barium sulphate system developed at the Sophia Jacoba mine near Huckelhoven, Germany; the Tromp magnetite process developed at the Domaniale mine at Kerkrade, Holland; and the Loess process developed at the Dutch State Mines, Heerlen, Holland.

The former French coal mines in the Saar basin were operated by a German company, Saargruben, A. G., until the Allied drive in March, 1945. Production of the 17 mines, normally 38,000 tons per day, was increased to 50,000 tons during the war. The coal beds in this basin range in thickness from 20 in. to 12 ft., and the depths of the shafts average 1,500 ft. At the Heinitz mine, five coal beds out of a total of eleven are active. The beds dip 10 to 30 deg. and are mined principally by the advancing longwall method. Only one of the beds is undercut, whereas all the others are mined with pneumatic picks. The coal is loaded into mine cars by shaking conveyors and a few belt conveyors. At this mine seven diesel and three compressed-air locomotives are used. The cars are dumped into a pocket underground and the coal is hoisted in balanced skips. Electric hand lamps with nickel-cadmium batteries are used by the miners, with flame safety lamps, of course, for gas detection. The mines are dry and dusty and are rock-dusted.

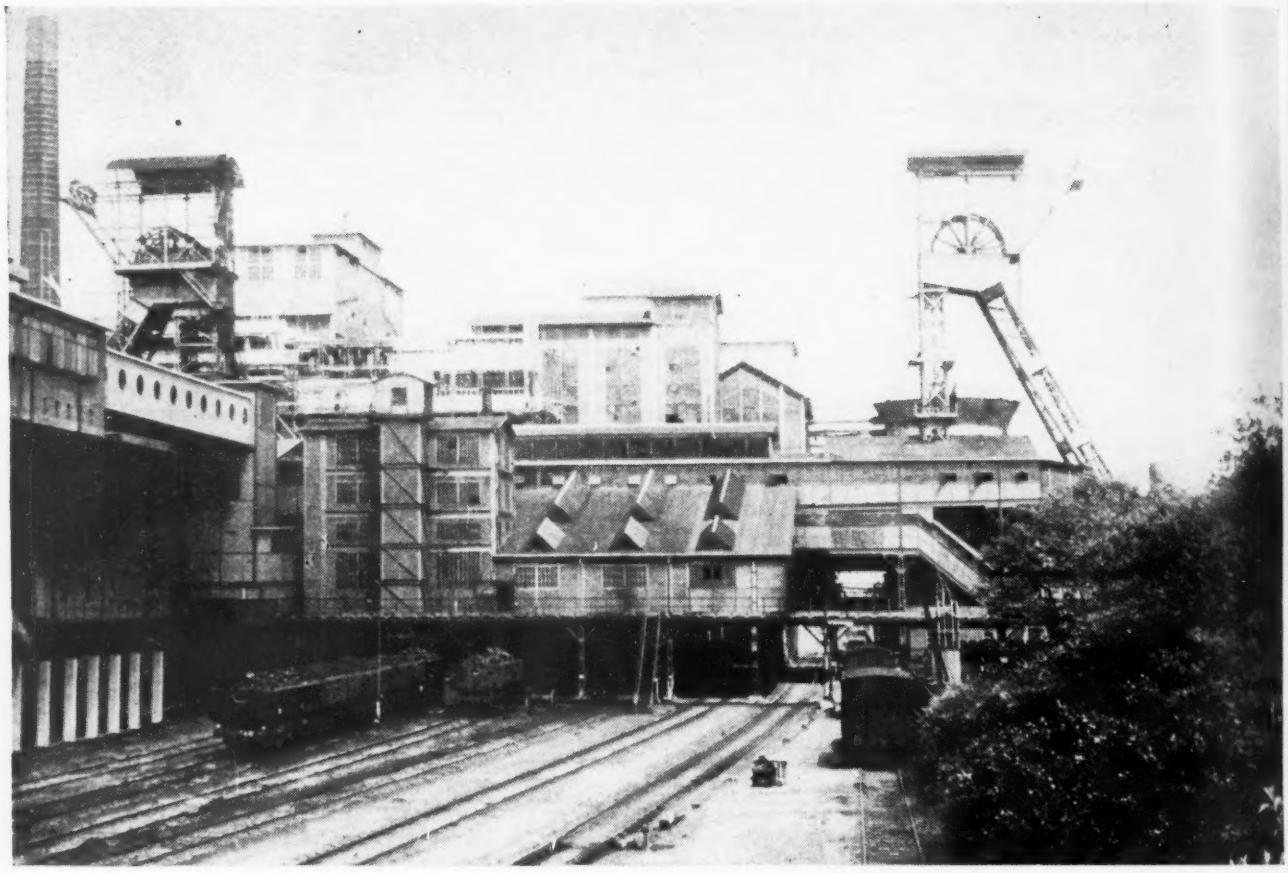
The most modern operation in the Saar is the Reden mine. The shaft at this mine is 2,200 ft. deep and has reached the seventh level. The rank of the coal increases with the depth of the beds. For example, the coal on the seventh level is significantly lower in volatile matter than that on the sixth. The best coking coal from this property contains 5 to 6 percent oxygen and 30 to 35 percent volatile matter. At other mines in the region the coal contains 7 to 8 percent oxygen, is weakly caking, and is used for making low- rather than high-temperature coke. At the Reden mine, which handles 5,000 to 6,000 tons per day, the coal is first screened to 3-in. and the oversize is hand-picked. The undersize then is screened into three fractions: 3x1-, 1x0.4- and minus 0.4-in. The smallest size is deslimed on vibrating screens with 0.3 mm. openings and thickened for flotation. Each of the three sizes is washed in separate sets of two-compartment piston jigs. The middlings from the second compartment are burned as boiler fuel. Table II shows the products of the preparation plant expressed as a percentage of the raw coal.

TABLE II—Results of Treating Reden Coal.

Product	Weight, Percent	Ash, Percent
Clean hand-picked lump	21.1	4 to 5
Hand-picked waste	9.0	.....
0.4x3-in. clean coal	35.1	7 to 8
0.3-mm.x0.4-in. clean coal	10.6	6 to 6.5
Clean flotation coal	4.9	8 to 10
Middlings from jigs	1.3	35 to 40
Jig and flotation refuse	18.0	70 to 80
TOTAL	100.0	

The Netherlands

There are twelve mines in the South Limburg field of Holland. Of these, four are state-owned and the remaining eight are privately operated. The an-



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Netherlands mining properties include the Emma mine, Dutch State Mines, Heerlen, Holland. They suffered little damage but lost small tools and equipment when the Germans were driven out.

nual production of the four State mines in 1938 was about 8,000,000 tons. The other eight mines produced about 5,000,000 tons. The maximum daily production of the Emma and Maurits mines had reached 13,000 tons each on occasion. The shafts at these mines penetrate 16 beds, and twelve of these were being worked on four levels. The beds range up to about 40 in. in thickness and the dip is 15 to 30 deg. Most of them are mined by the advancing-longwall method.

Wide Line Marketed

The Dutch State Mines, with a normal annual production of 8,000,000 tons, is one of the most progressive organizations in Europe, not only in coal-preparation experience and research but also in carbonization recovery and treatment of coke-oven products. In addition to coal, coke and briquets a line of chemicals and fertilizers is marketed. A $2,000,000 research chemical laboratory was dedicated in 1937, and a fine modern building unequaled in the United States was later built to house mining and coal-preparation research.

The financial success of this state-owned mining and processing organization is attributed by the management very largely to extensive use of the froth-flotation process. The run-of-mine coking coal is very friable, as indicated by the fact that as much as 50 percent of the minus 3-in. feed to the washing plants will pass a $\frac{3}{8}$-in. screen.

As in Germany, the plus 3-in. coal is hand-picked and the other size is washed. After fairly close sizing at the Maurits mine the various sizes of coal are treated in Coppee jigs of Belgian design. The finest size (minus $\frac{1}{4}$-in.) is washed in other piston jigs using an artificial bed of feldspar. A portion of the nut size at Maurits is cleaned in two heavy-media-process washers. One of these uses a suspension of loess, as developed by the company, and the other is a Tromp magnetite unit. Each of these machines is 6 ft. wide and treats 100 tons of nut coal an hour.

The froth-flotation plant at Maurits has a capacity of 1,500 tons of cleaned coal in 24 hours. It treats a feed made up of sludge passing a $\frac{3}{4}$-mm. wedge-wire opening collected from all the dewatering screens in the plant. This is thickened in cones and the underflow cleaned by flotation, using mechanical-agitation cells designed by the chief mechanical engineer of the company. At Maurits there are eight parallel banks of cells, each comprising five single cells in series. Using a byproduct coke-oven effluent containing some phenol and a little tar oil as the reagent, each cell makes a clean, final froth product and the refuse is successively recleaned in the succeeding cells. The feed ordinarily carries about 14 percent ash and the cleaned coal 5 to 8 percent ash, while the ash content of the refuse ranges from 76 to 81 percent.

Froth Treated for Coking

The froth is dewatered to about 22 percent moisture in drum-type vacuum filters and further dried with or without mixing with coarser coal from Elmore-type centrifugal dryers in three gas-fired rotary single-shell dryers to about 8 percent moisture. The dried product, with coarser coal, is crushed in hammer mills so that 60 percent passes a 3-mm. screen before being charged into the coke ovens. The coke plant has 489 ovens of Coppee, Otto and Koppers design with an annual capacity of 2,150,000 tons. In 1943 this plant was reported to have produced the largest output of coke in Europe.

POWER

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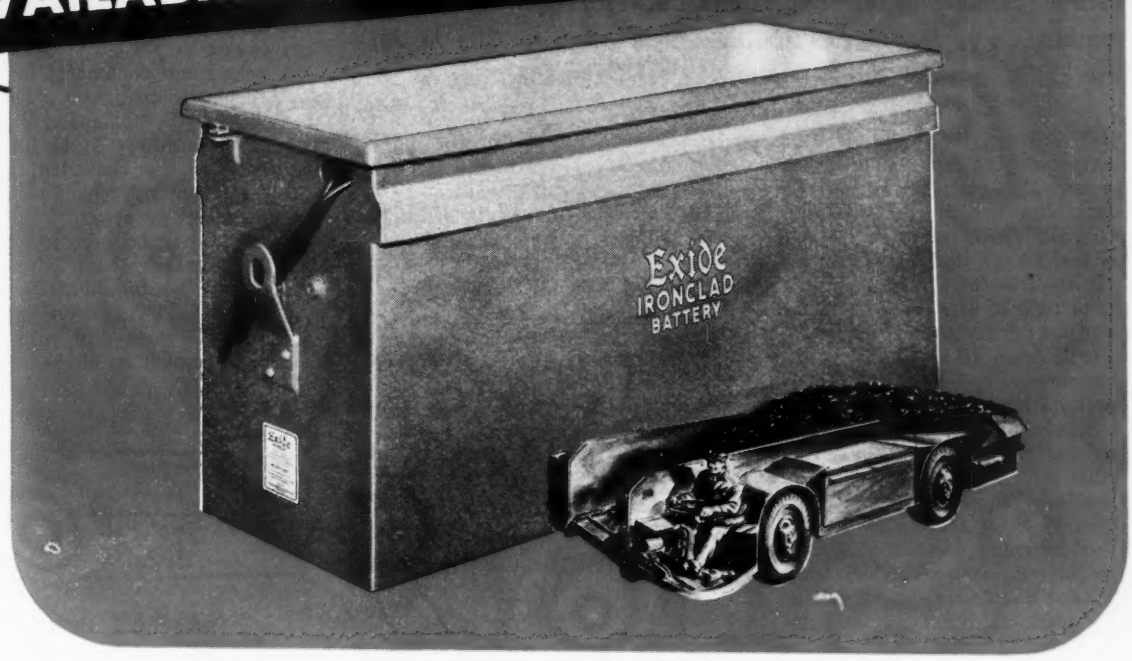

When fast, flexible shuttlecars are on the job and the power is supplied by Exide-Ironclads, there is no costly down time, no slowing up between shifts, no idle loaders and no long waits at the main line. You can count on "full shift availability" every day, month after month. You can also count on the increased tonnage and lowered haulage costs that naturally result.

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The Foremen's Forum

Percentages of Methane Increase Difficulty of Controlling Coal Dust

Methane Stimulates Dust Explosions, but With High-Volatile Coals Combustion Is Not Aided in Direct Proportion to Gas in Air—Law of Diminishing Returns Raises Cost of Dusting Gassy Coal

METHANE increases the explosibility of coal dust, especially the explosibility of the dust from low-volatile coals and from the lowest volatile coals of the medium-volatile classification. Its effect is not so marked with coals that have a high-volatile-matter content. It has been found that there is a long range of coals of varying analysis that have an equal tendency to explode. This range might be described as a "flat" in the explosibility curve.

The lower volatile coals on the one side require less incombustible dust to render them inert and the higher volatile coals, on the other side, require more. But in between is a long flat sweep where volatile matter strangely seems a factor of no importance, so the graph does not exhibit a straight-line increase in explosibility with increase of volatile matter. This flat in the explosibility graph is just as evident with methane present, but the hazard is increased by the presence of the methane.

A Percentage Paradox

Methane Most Effective With Low-Volatile Coal—However, it will be seen that though the percentage of incombustible material needed in a mixture of coal dust and rock dust to make the coal dust inexplosive rises slowly as the higher volatile coals are reached, the quantity of rock dust that has to be added to produce those percentages of innocuity increases very rapidly because it is always more difficult to raise a percentage in a mixture when it is already high than when it is still low, a fact very easily demonstrated mathematically.

How Much Rock Dust Should Be Used—At a meeting of the Coal Division of the American Institute of Mining and Metallurgical Engineers at Chicago, Oct. 13, 1938, H. P. Greenwald, supervising engineer, Experimental Coal Mine Section, U. S. Bureau of Mines, presented a table that furnishes a basis for the tabulations and graphs given herewith. The places where coals are found of the several percentages of volatile matter presented in Table I are duly stated at the foot of the graph. These are based on other publications of the U. S. Bureau of Mines and not on Mr. Greenwald's tabulation.

It will be noted that, in the fifth line of the tabulation, though the percentage of volatile matter increases from 25 to 40 there is no change in the quantity of incombustible dust needed in any of the three columns whether coal dust with methane absent, coal dust with 1 percent methane or coal dust with 2 percent methane is under consideration.

Uniformity of Explosibility From Philipsburg to Bruceton—As will be seen at the top of Chart I, the Philipsburg (Pa.) coals have only about 25 percent of volatile matter when the analysis is recalculated with the moisture and ash omitted in order to get as near as possible to a conception of the nature and content of the true coaly matter of the coal seam. The mines at Four States, W. Va., and at Bruceton, Pa., where the Bureau of Mines has its Experimental Mine, have coals that, calculated on the same basis, will have a volatile constituent of about 40 percent.

Coals that lie between these two limits, which, by the way, form a truly large proportion of the bituminous coals in the Eastern States, all need one and the same percentage of rock dust to render them explosion proof if no methane is present.

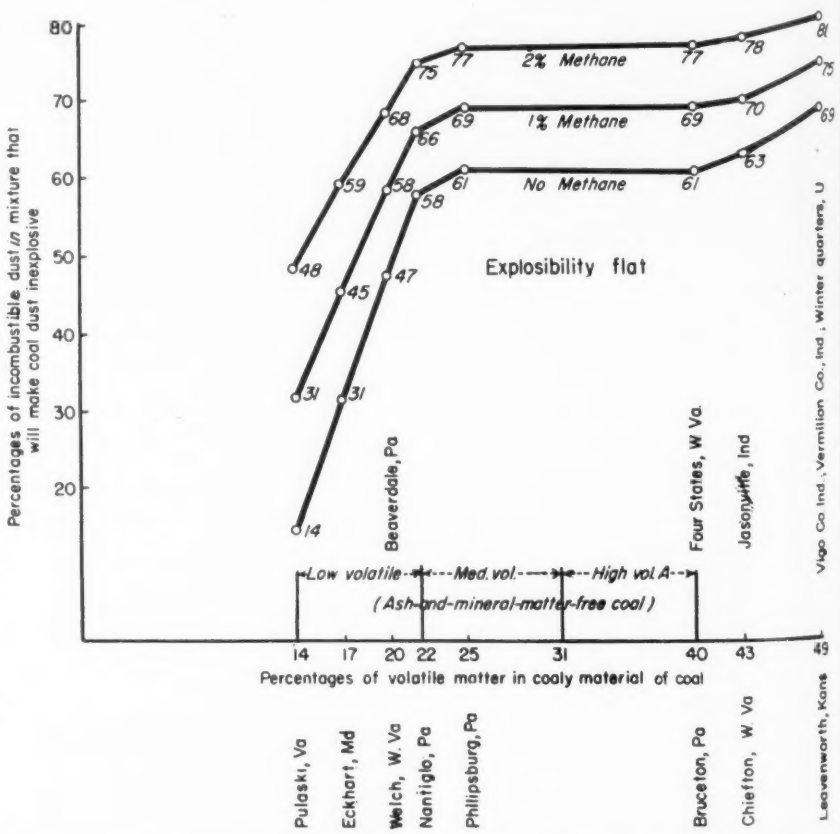

Chart I—Graph shows the quantity of rock dust needed to prevent coal dust from exploding when air has no methane and also when it has 1 and 2 percent of that gas. Note the flat place in the graph. Coal which has 25 to 40 percent of volatile matter is all equally dangerous, but beyond 40 percent volatile matter, coal takes a further rise in malignity. Here, however, methane adds less to coal's potency for mischief.

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. . . and that fundamental fact has just struck the piano player!

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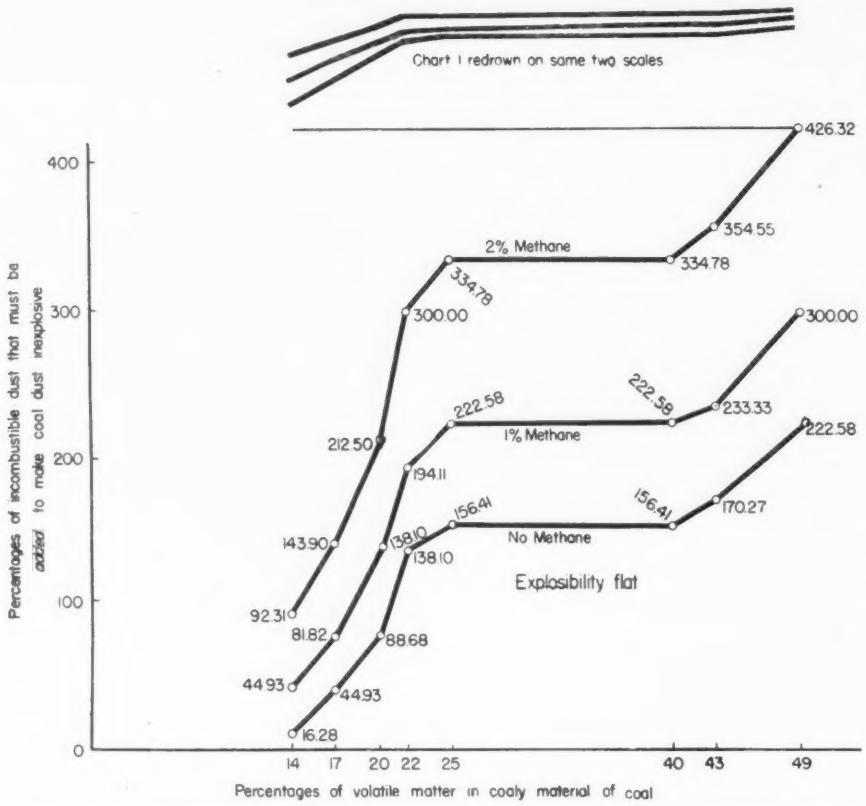


Chart II—In this chart, the figures are based not on the quantity of the ingredients in 100 units of the mixture of coal dust and rock dust but on the quantity of rock dust that must be added to 100 units of coal dust to give the required mixture. The highest figure in Chart I is 81 and in this chart is 426.32. However, the change in scale disguises this tremendous difference in quantities, so the main features of Chart I are reproduced at the top of the illustration on the two scales of the lower graph.

Methane Raises Values But Leaves Uniformity Undisturbed—The percentage of incombustible dust which the dusts of these coals need with 1 percent of methane in the mine atmosphere is higher than when no methane is present, but it is uniform for all the dusts of coals within this same range. It is still higher, as might be expected with 2 percent of methane, but it is still uniform for all the dusts in this broad category. These coals are all either "medium volatile" or "high-volatile A".

Rock Dust Needed Much More Than Percentage in Mixture Would Indicate—Table I gives the figures from which Chart I is constructed, and Table II corrects a natural tendency to believe that the degree of explosibility and the quantity of incombustible dust that must be added are directly proportional to the percentage of incombustible material required as recorded in Table I.

In mine operation we need to know not only what proportions of coal dust and incombustible dust will suffice in the mixture of dusts but, given the quantity of coal dust to be rendered incombustible, we want to know how much incombustible dust will have to be added to reach those proportions and thus guard the coal dust from explosion. The figures are derivable one from the other but are far from identical, as a comparison of the figures in Table I and Table II will show.

How Percentages of Mixtures Are Misleading—The analysis of the mixture is misleading as showing explosibility and cost because it gives the quantity of immunizing material needed for a varying quantity or explosive material: to wit, for the *complement* of the quantity of immunizing material. The more the percentage of immunizer has to be increased, therefore, the less becomes the percentage figure for the quantity immunized. Where 81 lb. of incombustible is required in the right lower corner of Table I, its duty is only to immunize 100 — 81 = 19 lb. of combustible material, whereas what we want to know is how much will be needed to immunize all the coal dust, not 19 percent of it. Thus for every pound of coal dust there will be 100 ÷ 19, or 5.2632 times as much mixture as coal dust, or 5.2632 lb. of mixture. But, as there is only 1 lb. of coal dust, there will be in the mixture 4.2632 lb. of incombustible dust. The quantity of incombustible dust added therefore will be not merely 81 percent but 426.31 percent.

Law of Diminishing Returns—Table II has been prepared in accordance with this reasoning. It can be seen how much dust must be added where the coal has a large percentage of volatile matter and the air has a fair percentage of methane. Where the coal has 43 percent of volatile matter and the air current has 2 percent of methane, the mixture will need to have 28 percent of incombustible dust. When the coal has 49 percent of volatile matter and the same quantity of methane the mixture will need 81 percent of incombustible dust, an increase of only 3 percent, according to Table I. Now look at Table II, where the similar increase is 426.32 — 354.55 = 71.77 percent. If 95 percent of incombustible dust in the mixture were needed, 1,900 percent of such dust would have to be added. So high-volatile coals, such as those in Indiana, Illinois and Utah, involve for safety a heavy cost for rock dust.

Chart II is constructed to illustrate these figures and drive home their importance. Here is exhibited what economists designate "the law of diminishing returns." When the coal dust needs only a little rock dust, a little goes a long way; 16.28 percent added raises the percentage 14. When it needs a high percentage of rock dust, a lot of rock dust goes only a little way; 426.32 percent is needed to raise the percentage to 81. Should 100 percent rock dust be desired—for some unaccountable reason—an infinite quantity of rock dust would not bring the mixture to the percentage demanded.

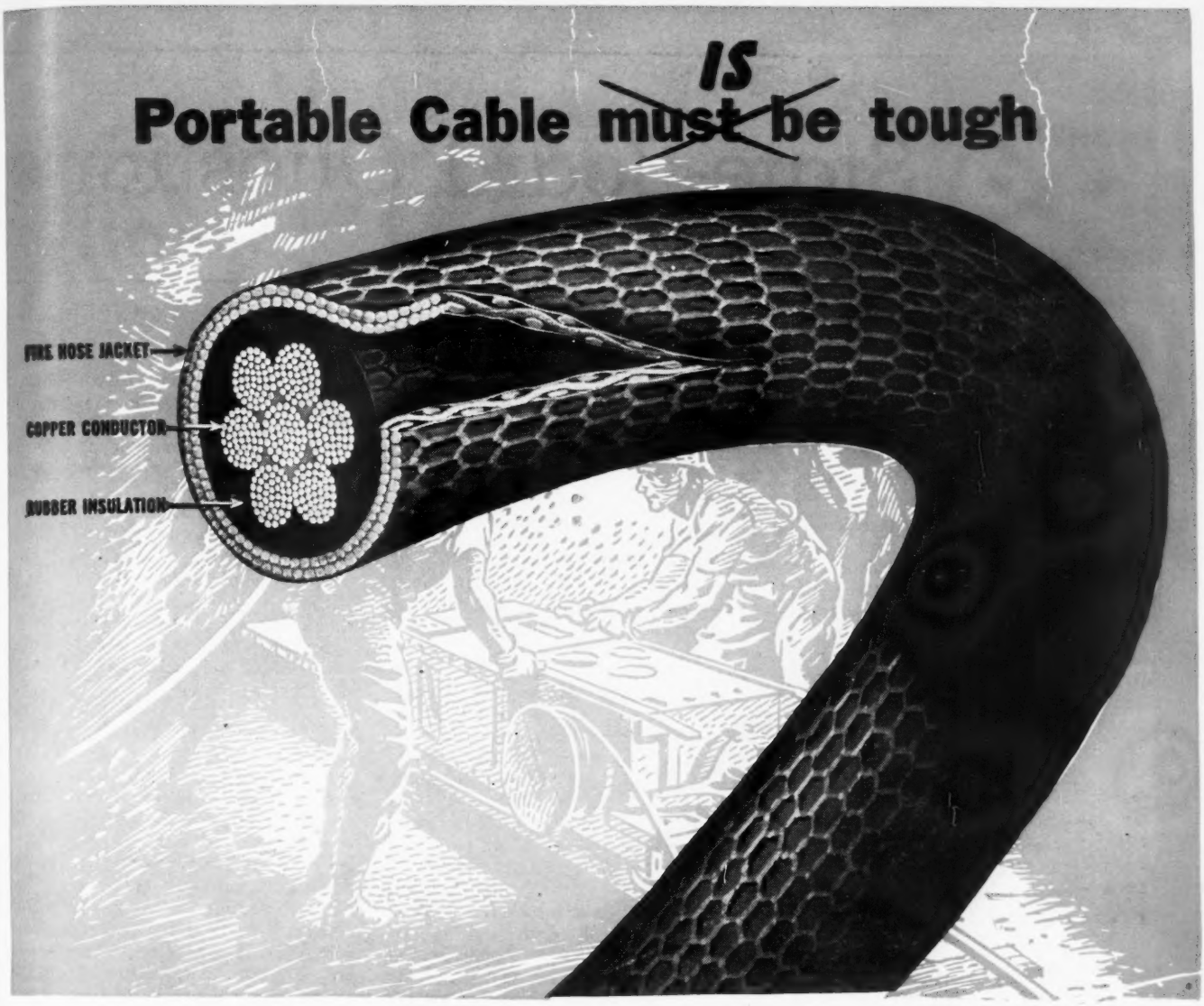
TABLE I—INCOMBUSTIBLE DUST NEEDED TO PREVENT AN EXPLOSION

Calculated Volatile Percentage in Coal After Figures for Moisture and Ash Have Been Deducted	What Proportion of Incombustible Dust Must Be Present in a Coal-Dust Mixture to Prevent an Explosion When the Methane Content in the Air Current Is as Tabulated Below		
	Methane 0 Percent	Methane 1 Percent	Methane 2 Percent
	Incombustible in Coal Dust		
Percent	Percent of Mixture	Percent of Mixture	Percent of Mixture
14	14	31	48
17	31	45	59
20	47	58	68
22	58	66	75
25–40	61	69	77
43	63	70	78
49	69	75	81

TABLE II—HOW MUCH INCOMBUSTIBLE DUST MUST BE ADDED TO COAL DUST TO PREVENT AN EXPLOSION

Calculated Volatile Percentage in Coal After Figures for Moisture and Ash Have Been Deducted	How Much Incombustible Dust Must Be Added to Coal Dust to Make It Inexplosive When the Percentage of Methane in the Air Current Is as Tabulated Below		
	Methane 0 Percent	Methane 1 Percent	Methane 2 Percent
Percent	Percent	Percent	Percent
14	16.28	44.93	92.31
17	44.93	81.82	143.90
20	88.68	138.10	212.50
22	138.10	194.11	300.00
25–40	156.41	222.58	334.78
43	170.27	233.33	354.55
49	222.58	300.00	426.32

Portable Cable ~~must~~ IS be tough



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State-Board Questions

Coal Age Quiz

Q.—How does the rectifier operate?

A.—The rectifier operates in the manner it does because all atoms contain certain infinitesimal particles charged with negative electricity. These particles revolve around a nucleus or central body or bodies as planets revolve around the sun. These particles are so much smaller than the nucleus that, for a while, it was believed that they did not exist as matter but were, in a sense, unembodied charges of electricity. They are known as electrons. A copper atom has 30 such electrons, whereas hydrogen has only one, nitrogen has seven, oxygen eight, and carbon six. Under certain kinds of electrical

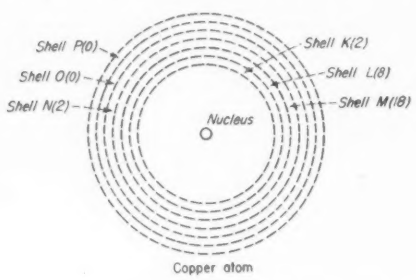

Fig. 1—An atom has a nucleus and a number of electrons revolving around it in orbits having various radii and located in different planes. They are represented as revolving in separate imaginary concentric spherical shells designated *K, L, M, N, O and P*, though some have electrons in only one or a few spheres. Copper has 2 in K, 8 in L, 18 in M and 2 in N, with none at all in O and P.

or magnetic stress and when exposed to heat the electrons appear to travel by short jumps from atom to atom, replacing those leaving another atom.

Motion Along a Conductor—As the natural direction of the electrical current is from negative to positive, the electrons, being negative, are drawn to the anode through the conductor, the cathode and the gap in the rectifier tube. This latter path they travel without much difficulty because the mercury bath is heated, and heat still further agitates the electrons, freeing them, or some of them, from the nuclei. Perhaps also vapor from the mercury cathode assists the electrons in traveling.

Potential of Anode—The anode is of lower potential than the cathode when the coil to which the anode is attached is creating a current in the transformer coil which draws electrons from the anode. At other times, the current in this same transformer coil is passing toward the anode, and the anode accordingly may have a somewhat higher potential than the cathode, and then the conditions favor the travel of electrons in the opposite direction.

In the illustration showing the connections of a rectifier, it will be noted that in the rectifier chosen for description there are six tubes, or tanks. Sometimes there are as many as twelve. Each tube has a graphite anode that is connected to one of the exterior terminals of a six-phase star, each of the limbs of which represents one of the secondary coils of a transformer.

Current in Tube Is Not Reversed—The current in each coil of the star reverses with every revolution of a coil in the generators; thus at one moment the anode of a rectifier tube is at a higher and at another at a lower potential than the cathode of that same tube, making a condition that offhand would suggest that current should flow back and forth through the gap in the rectifier tube. But in a rectifier tube the current almost always travels from cathode to anode. If in a rectifier, it happens once in a week that the current travels back from anode to cathode it is regarded as evidence that the rectifier is not working quite satisfactorily and steps must be taken to restore its normal functioning.

When one of the coils—for instance BA—is carrying electrons from *B* to A, it is carrying other electrons to *B* from the conductor leading from its anode, in this case marked *D*. Electrons don't travel as fast as electricity. You may recall that impulses often travel faster than the materials by which impulses are conveyed. You strike the end of a long steel rod, and the impulse almost immediately moves the molecules of the bar at the far end almost as much as the molecules of the rod at the near end, but the rear molecules don't move up to the front end of the bar as a result of that one blow. Electricity is not electrons; it is an impulse occurring by reason of electron movement. This impulse is carried backward as well as forward to the generator. In consequence of the electrons being moved from *B* toward A and from *D* toward *B*, electrons are drawn from *E* across the gap in the rectifier tube to *D* and thus along the direct-current bus.

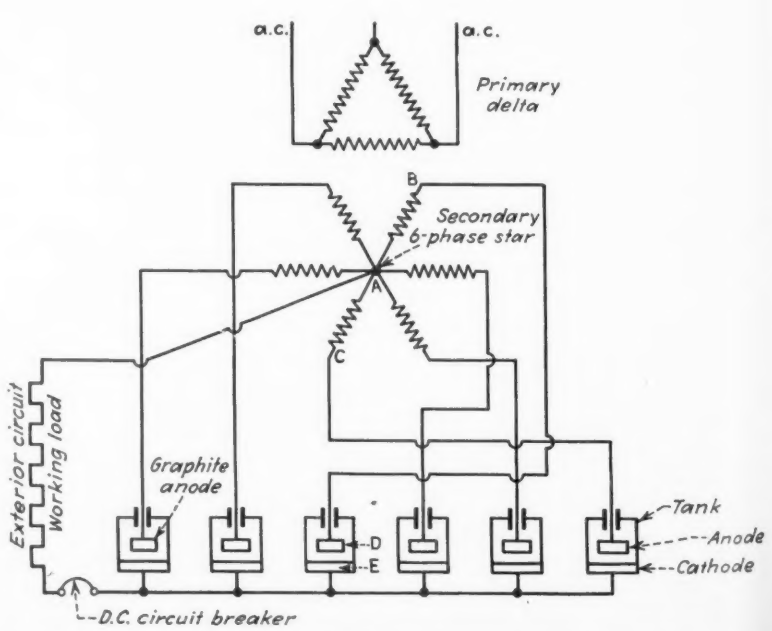

Fig. 2—Diagram showing connections of tanks, or tubes, of a rectifier with direct- and alternating-current buses.

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Among men who know coal best, four out of five say dust-proofing is a necessary peacetime service. Eighty-one per cent of the anthracite and bituminous mine-operators, answering a recent, impartial survey, voted for dust-proofing.

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With COALKOTE, the modern, easy-to-use coal-spray, you can supply your customers with clean fuel. Help them eliminate unnecessary housecleaning. COALKOTE makes the particles of dust adhere to the big pieces, helps end consumer-complaints over coal-dust and dirt.

COALKOTE is available now in unlimited quantities. It can be used for coal, coke, or briquettes. It does not corrode equipment. Write or telephone us today for complete information on COALKOTE, and complete results of this new, important survey on marketing-trends. It's "The Answer to One of Your Most Important Problems."

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Fig. 3—Cross-section of a rectifier tube.

While the current is traveling from *B* to *A* it is traveling also from *A* to *C* and thence it reaches the rightmost tank, where as has been said it can very rarely and under most exceptional circumstances leap the gap from anode to cathode. So nothing usually happens as a result of the current traveling from *B* to *A*, but only when it travels from *A* to *B*.

Only Half the Tubes Operate at Any One Time—It will be noted that three of the tubes are hooked up momentarily so that the current will tend to travel away from their anodes and so cause a flow of current in the direct-current bus and in the exterior circuit with its mining machines, loading machines, drills, trolley locomotives and what not. The other three tanks are hooked up momentarily so that the current will be unable to flow at all. Thus if any current doesn't flow in the right direction to keep the electricity in the direct-current bus flowing in that direction, it doesn't flow at all. The tube just idles along until current impulses it is able to use come along.

Works Like a Ratchet

The action of the rectifier has been compared to the action of a ratchet; when the ratchet travels backward it merely idles over the ratchet teeth, and when it travels forward it engages them and pushes the ratchet bar forward. Here, as it were, there are three ratchets going forward and three going backward; always three going forward to move the ratchet, always three going back to prepare for the next advance.

Duds Revive and Die Again—And in this case, as with the ratchet, there is a reversal. The alternating current changes its direction and the electrons now flow from *C* to *A*, and then the anode in the rightmost tube draws on the cathode of that tube so that it yields electrons which will jump the gap. In the two other tubes that were just recently duds, the current also passes through the rectifier, but three others, the tubes just recently active, become duds and pass no current. So all the time there are three active tubes and three duds, and the current is always in one direction, one that carries it along the bus toward the several tanks, or tubes.

The carbon anode refuses to act as a cathode apparently because it is cool and because the difference of potential is not so favorable as it is when the current is traveling in the other direction, for there is a loss in potential in passing the gap. Perhaps the material of the "anode" has some influence because carbon, silicon, germanium, lead and tin are the sole elements having four electrons in the most remote shell. Carbon has only six electrons in all. When the tube becomes hot, the electric current may flash back from the anode to the cathode. That is why the tubes of a rectifier are kept cool by circulating water in jackets on their outer surfaces.

Nothing has been said as to the little auxiliary anode and the starting igniters of boron carbide by which, when starting the rectifier, the mercury pool that forms the cathode is made hot, nor of the splash-hood baffle that aids in preventing flashbacks. The deionization baffle also collects the ions of mercury that otherwise would provide a path for such reversals of current.

Efficiency of Rectifier

Q.—What efficiency can be expected from a rectifier?

A.—Because only a certain definite voltage is needed to cause the electrons to pass through the extremely rarefied air of the rectifier and as the voltage remaining after this definite loss must be compared with the voltage of the actuating current to obtain the relative efficiency, the loss of efficiency will be greatest when the voltage of the actuating current is lowest. In consequence, with a very low voltage, there will be no efficiency. All the voltage will be used up in the resistance that the electrons will experience when, in making the passage from cathode to anode, they come in violent contact with the atoms in the rarefied air, few though the atoms are. Loss of efficiency will equal:

Voltage Loss x 100 ÷ Entering Voltage.

By doubling the entering voltage, the loss of the efficiency will be halved, for the devisor is doubled.

However, the efficiency of the rectifier even at somewhat low voltage is still high. When the operating potential is 250 volts, the efficiency is less than 2½ percent lower at full load than when the potential is 600 volts. When the air is greatly rarified, the electrons that carry the electricity between terminals can make the trip with greatly reduced resistance, just as airplanes can travel with reduced friction through the rarified stratosphere. For this reason, care to maintain a good vacuum in the tanks is imperative. It determines the power loss in the rectifier.

With a 250-volt rectifier, if the demand for power falls to 20 percent of full load, the efficiency may drop to about 89.5 percent, but with a similar load on a synchronous rotary converter the efficiency will drop to 84 percent and with a synchronous motor-generator set will fall to 72 percent.

Why Designated Rectifier

Q.—What is a rectifier and why is it so designated.

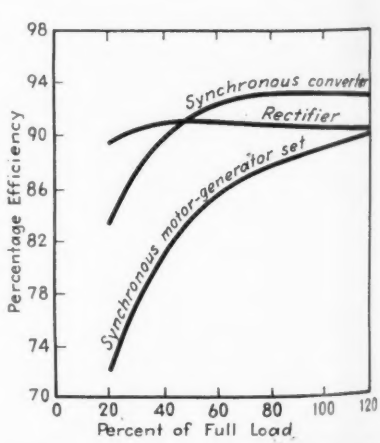
A.—A rectifier is an electrical device to change alternating to direct current or, in other words, to "convert" current that goes backward and forward alternately as does alternating current, or, as might be said, reversing current, into current that flows in one direction only. However, with both alternating and direct current both the voltage and amperage are not wholly stable but vary somewhat because of the manner in which such power is generated.

The change from alternating to "direct" or, better, "continuous" current is made automatically by the electrical connections of several tanks which mysteriously perform their functions without moving parts, though there are moving parts in the heat-exchange system (water pump and blower fan) and in the vacuum pump also, if a pump-type rectifier is used, as is customary with large units. However, these are mere accessories. They do not switch the current. Because it makes the current di-rect, it is designated a rectifier meaning literally "that which makes direct," just as "rarifier" means that which makes things rare or thin or "clarifier" signifies "that which makes clear."

Converter Saves Power

Q.—How efficient is the rotary converter?

A.—Generally when designed for normal mine use and when the rotary converter is operating near or above its full load, its efficiency is as much as 93 percent of the load to be converted. Using only 20 percent or one-fifth, of the full load in amperes, the efficiency will ease off to only 84 percent. Thus the rotary converter is well suited to handling the mine requirements, which too often drop to one-fifth of full load. In consequence, the converter is efficient and saves power.



Efficiency of three means of rectification compared.

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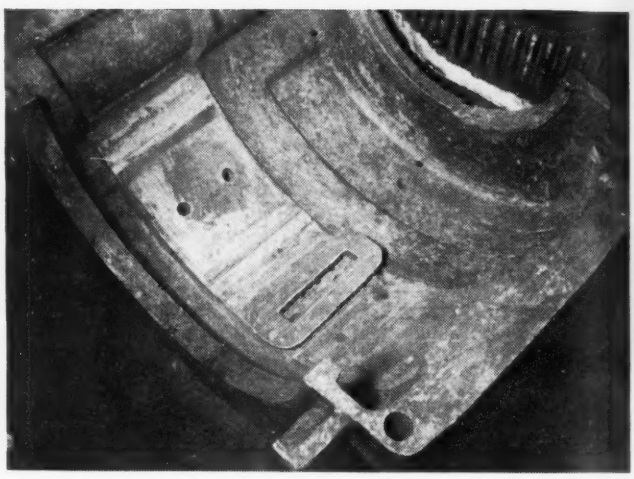
WALTER TRACTOR TRUCKS

Operating Ideas

Coil Springs and Padded Plates Keep Interpoles Snug

Springs set in recess holes. A plate with pad on one side and studs on the other lies beside them.



Padded plate and springs in place ready for assembly of the interpole.

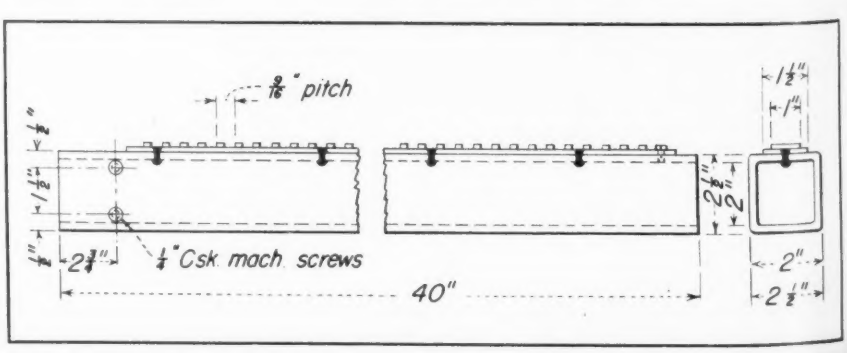
On 13-ton locomotives at one mining operation, interpole field coils come loose entirely too often, so a design change is being made as the motors of these locomotives come into the main shop for overhauling. This change consists of adding a plate with coil springs between it and the field frame. The springs have sufficient range to take up any slack caused by compression, drying or wear of the coil insulation.

Twelve coil springs are used and these are made of $\frac{1}{16}$-in. wire (No. 16, N.W.C.), wound six turns with outside dimensions $\frac{3}{4}$ in. diameter and $1\frac{1}{8}$-in. long. Holes $\frac{5}{16}$ in. deep are drilled into the field frame to seat the springs. The plate is $\frac{1}{4}$-in. steel with a coil pad of $\frac{1}{4}$-in. belting riveted to one side. Matching the spring positions, holes are drilled through the plate and tapped for $\frac{3}{8}$-in. studs. The latter are put in as a tight fit and cut off with $\frac{5}{16}$ in. projecting on the other. This arrangement of holes in the frame and studs on the plate holds the springs in operation position and simplifies the problem of assembly.

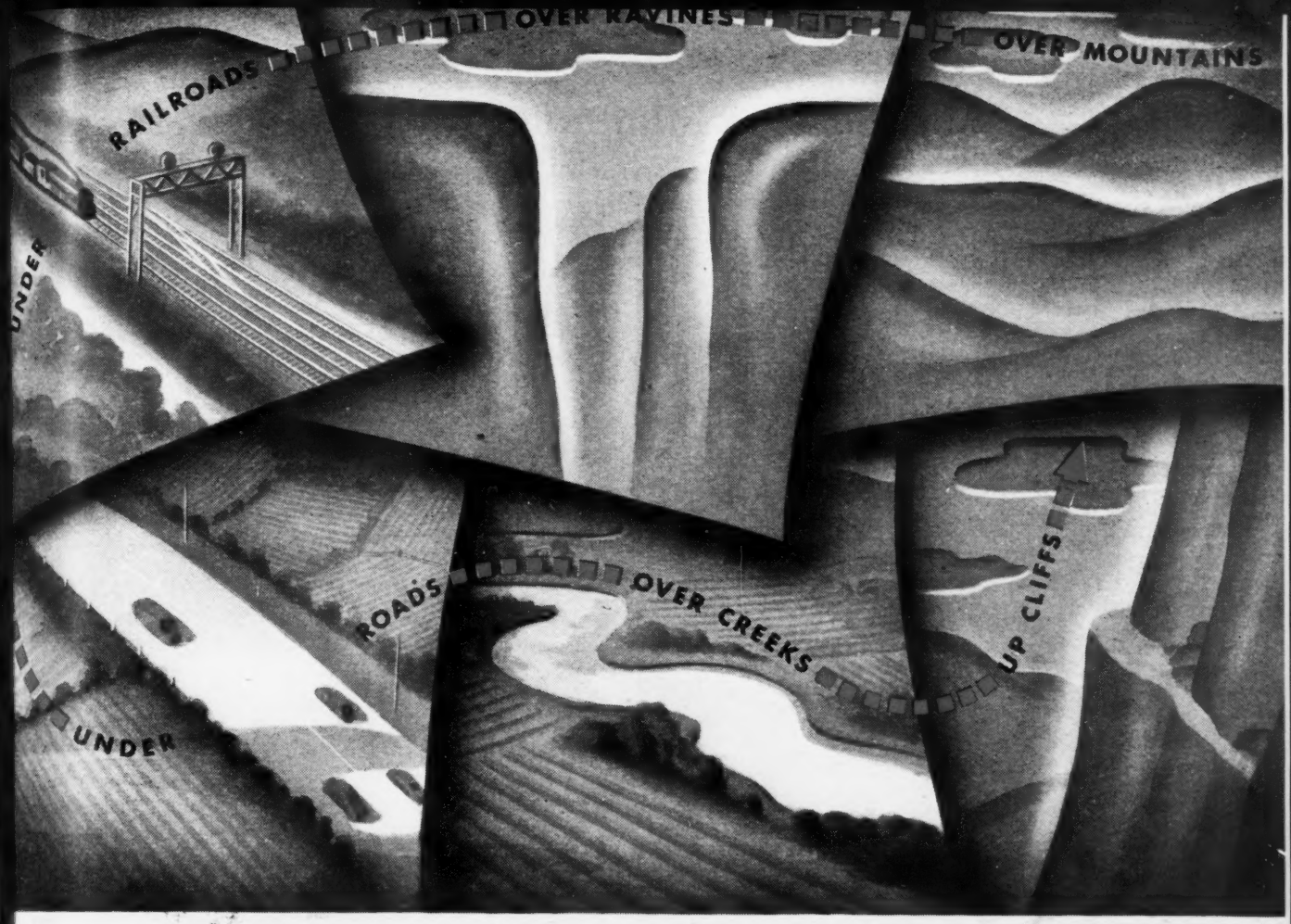
Coal Drilling Equipment Made Stronger

Aluminum drill posts for electric coal drills have been made stronger at mines of the Pittsburgh Coal Co. by substituting rivets for capscrews. This change, shown in the drawing and now followed with all original posts that go through the Library shop for repairs, was suggested by O. C. Luce, Banning No. 1 mine, Van Meter, Pa.

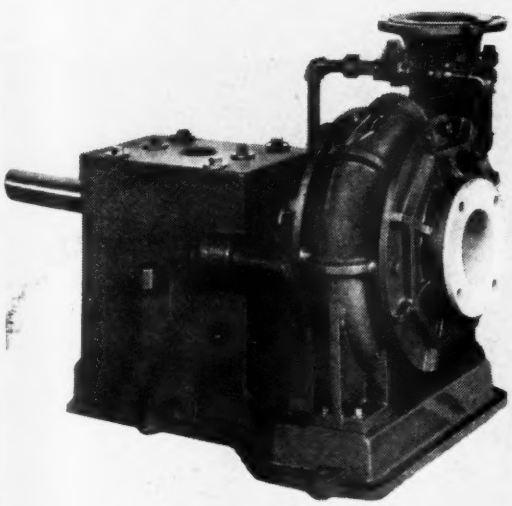
Originally the steel racks were held onto the posts by $\frac{5}{16}$-in. capscrews with countersunk heads. The weak point was the threading in the aluminum. The use of rivets gives a job as strong as the aluminum wall of the post.



Racks are now riveted to the drill post instead of being attached by capscrews.



HYDROSEAL *pumping does things no other transportation system can do*



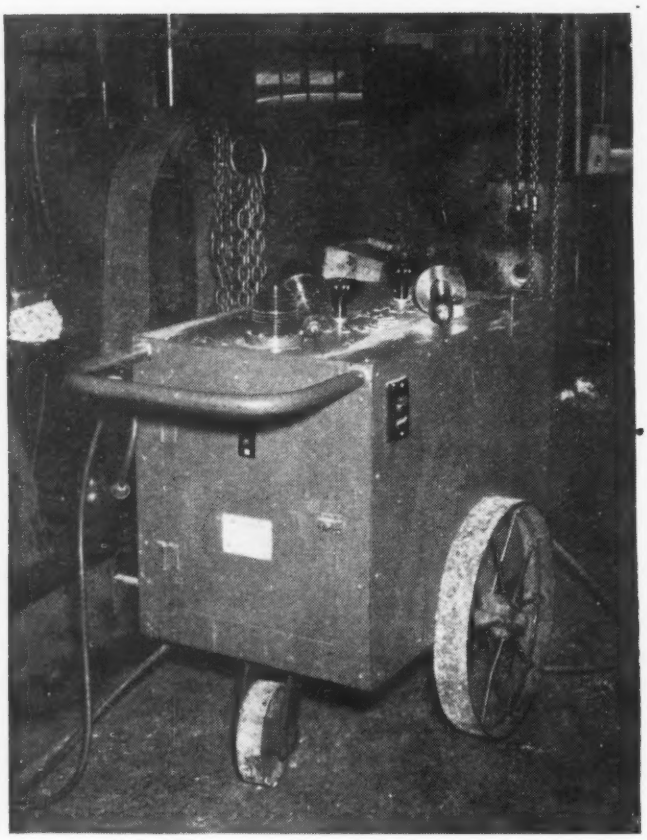
Think of any means of transporting materials known to man today. No one method will do all the things illustrated, except a pipe line. And with Hydroseal Pumps, every one of these conditions can be met in one installation. And further, the system will be most reliable, day-in and day-out, regardless of sleet or ice, and most economical in first cost and upkeep (no roads or bridges), even when handling the most abrasive of materials. If water is scarce and valuable, it can be reclaimed and recirculated. And remember, Hydroseal pumping is a one-way transportation system with no empty return trips. If you have a problem of getting coal to your tipple or breaker or in the disposal of rock refuse or culm, especially to keep within State Anti-Silt Laws, better see one of our engineers. Write us. We'll send Catalog 140 right away, so you can see how the Hydroseal Principle and Maximix Rubber make the pumping of abrasive material reliable and economical.

HYDROSEAL

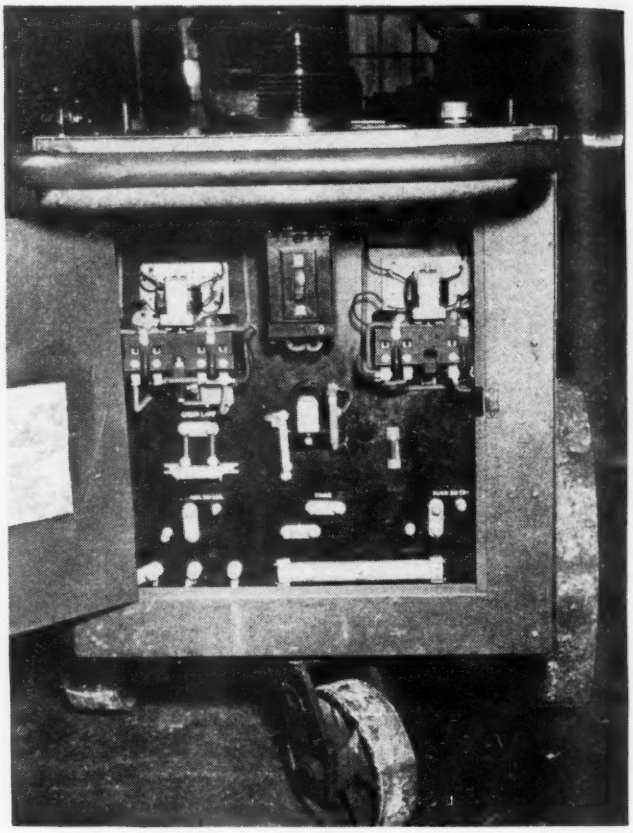
THE ALLEN-SHERMAN-HOFF CO., 231 S. 15th Street, Philadelphia 2, Pa.

Offices and Representatives in every Coal Mining District in the United States.

Tester Helps Eliminate Uncertainty



Portable insulation tester is rolled to armature stand in the shop for a test.

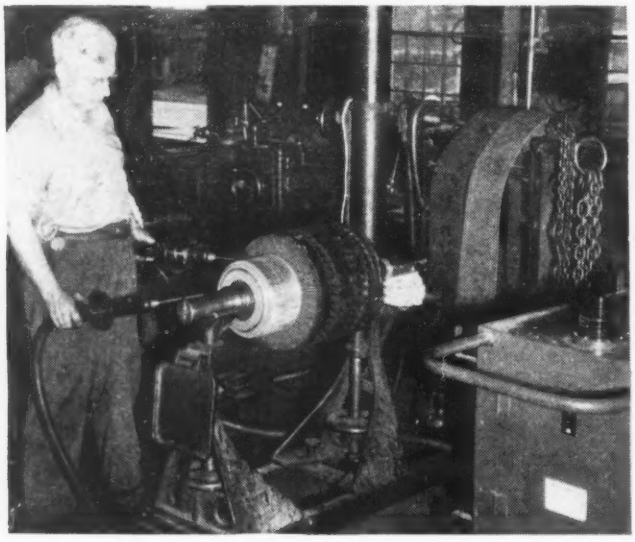


The magnetic control devices are located in one end of the tester.

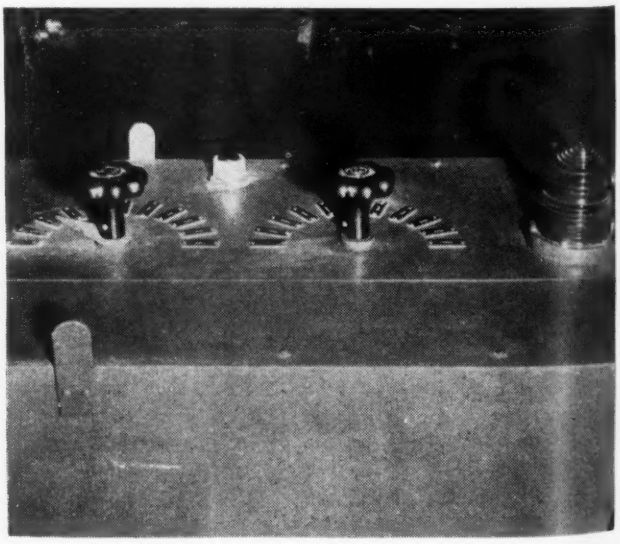
A "HI-POT" MACHINE for appraising the insulation strength of the electrical equipment was added as part of the modernization program, says S. E. Miller, foreman of the electrical department of the Lehigh Navigation Coal Co.'s Central Repair Shop, Lansford, Pa.

The Westinghouse Style No. 1263137 portable testing outfit, shown in the accompanying illustrations, has been in service almost two years. A secondary voltage of 12,000 can be had in 60 control steps from the 5-kva. tester operating from a 110/220-volt 25-60-cycle power supply as available.

In "hi-potting" repaired armatures a test voltage of twice normal operating voltage is used. On rewound jobs the test voltage used is twice the operating voltage plus 1,000.



Bernard Higgins, armature winder, tests an armature.

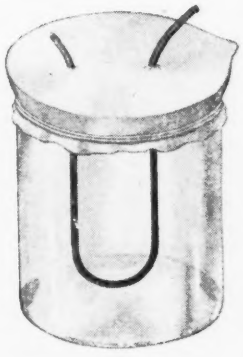


Control knobs raise the secondary voltage to 12,000 in 60 steps.

Don't get mad, Monk. Your dousing is only a molehill compared to the mountain of abuse U.S. Royal Cords and Cables must absorb before being certified safety tested.

Precise and scientific laboratory tests, such as for moisture absorption, assure you Cords and Cables that more than meet all requirements—U. S. Royals are also subjected to heating, freezing, bending, stretching and impact tests.

MOISTURE ABSORPTION TEST



Conductor Insulation: **9 inches of insulated conductor are immersed in distilled water at 70° C for 7 days. Conductor is then removed and weighed and amount of water absorbed calculated from the increase in weight—moisture absorption of U.S. Royal does not exceed 25 milligrams per square inch.**

Jacket Compound: **Sample of jacket compound of uniform 0.100 inch thickness with surface material removed is first weighed, then immersed in distilled water at 70° C for 7 days. It is then removed and weighed and the amount of water absorbed is calculated — U. S. Royal Mining Machine Cable jacket absorption not more than 60 milligrams per square inch.**

SPECIFY THE NEW U. S. ROYAL *Safety Tested* MINING MACHINE AND LOCOMOTIVE CABLES

UNITED STATES RUBBER COMPANY

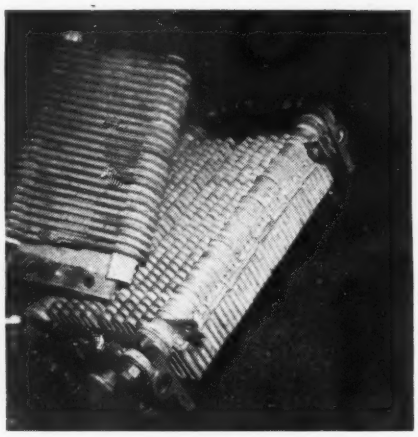
1230 AVENUE OF THE AMERICAS • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

SERVING THROUGH SCIENCE WITH ELECTRICAL CORDS AND CABLES

Stainless Steels Used to Improve Resistances

PURSUING A POLICY of eliminating the frequent repeaters in the long list of equipment items that continue to cause maintenance worries, officials of one mining operation are having the resistances of 8-ton locomotives rebuilt as they come to the shop for repairs.

The terminals of the grid resistance (see illustration) have been fitted with terminal plates of stainless steel instead of copper. With continued exposure to heat the copper rapidly oxidized and introduced a contact resistance that resulted in more heat and final failure. On the other resistor, which has been rewound, terminals at the top edge will be attached by electric arc using Stainweld electrode. This makes a connection that will stand as much heat as the rest of the unit.

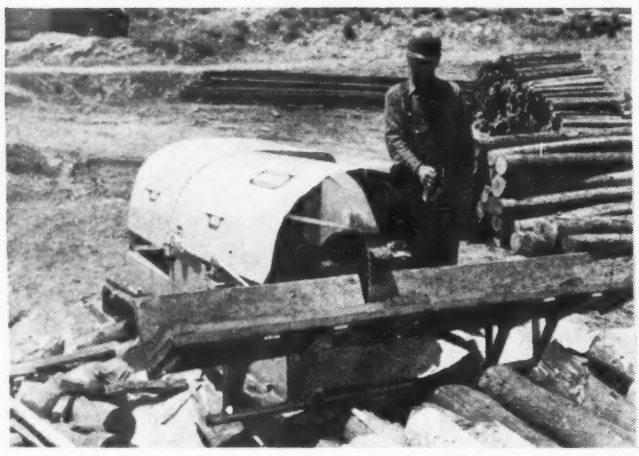


Resistance of 8-ton locomotives undergoing changes in the shop.

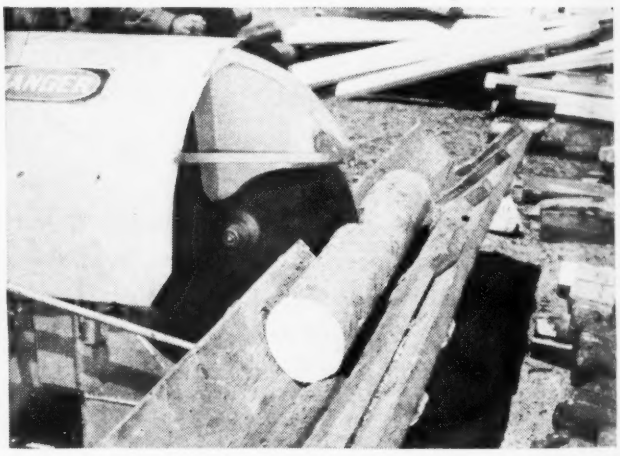
On Display

Despite improvements in new equipment, there always will be a need for maintenance. That's why this department knows it has a great future and desires, more than ever, to render service to the industry—and, particularly, to those who "live with" the equipment. We therefore solicit for display some mechanical, electrical, operating or safety idea which you have put to work. If accepted, Coal Age, upon publication, will pay you $5 or more for each.

Cut-Off Saw Made Safe



The operator runs the saw from a safe position.



The log resting in the trough is forced into the saw.

SPECIAL COVERS and other facilities have been installed to increase safety in operation of a motor-driven cut-off saw in the timber yard at the D. O. Clark mine, Union Pacific Coal Co., Superior, Wyo., George A. Brown, superintendent, reports. The complete saw rig, shown in the accompanying illustrations, is provided with steel covers to protect the motor and drive from the weather and to afford protection to the operator. In front of the saw a two-section trough can be tilted at will by the operator to force the log into the whirling saw. To lessen the risk, only one man is permitted to operate the rig. When he leaves he locks the electrical control and keeps the key to it on his person.

Lamp Batteries Repaired at Central Shop

MORE THAN 5 PERCENT of the cap-lamp batteries used at the three collieries of the Lehigh Navigation Coal Co. in 1944 had their individual cells rebuilt at the Central Repair Shop, Lansford, Pa.

Bad-order batteries are gathered each day from the various collieries and taken to the electrical shop for a general overhaul. Here, as many as four repairmen are busy repairing battery cells blasting machines and kindred mechanisms. In the case of battery cells, after they are individually serviced each is checked electrically on the test rack shown in the accompanying illustrations.

The double-pole double-throw switches at the end of the rack are used in charging (when thrown up) and discharging (when thrown down) cells on the several shelf circuits. When the switch is down, reverse polarity is applied from the generator and the rate of discharge is stepped up considerably. The single-pole, double-throw switches on the side of the rack are for grouping the cells in series in sets of three.

Throwing the switch blade to the right allows the three cells in series to discharge through a regulation cap-lamp bulb. Throwing the switch blade to the left com-

HERE'S TOP COMPRESSOR PERFORMANCE AT ONLY #484.51

THE CANTRELL "SL" COMPRESSOR

★ If you need a compressor, you need a Cantrell. You need a Cantrell first, because every Cantrell is especially designed and built to take the punishment of hard service required of them in coal mining . . . and like it. You need a Cantrell second, because you get this maximum service for the least number of dollars. You need a Cantrell third, because of our liberal Factory Rebuilt Compressor Exchange Plan which eliminates expensive overhauling of compressors in your own shop.

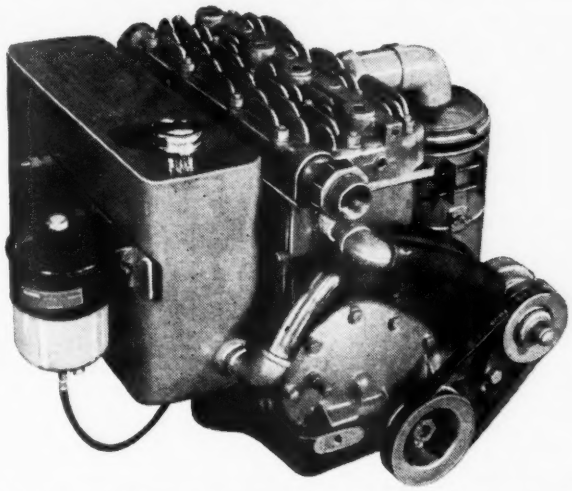
Illustrated above is the Cantrell "SL". A compressor outfit, complete with air receiver and base, shipped to you, ready for installation with your own drive motor, at only $484.51 F.O.B. our plant.

The "SL" is designed for stationary use in your shop or for mounting in mine car for transportation to points of service. Drive motor will be supplied, of course, if preferred, at extra cost, making this outfit complete, ready for service upon arrival.

Other Cantrell Compressor Outfits include: the "SP" — self-propelling compressor and 2-ton locomotive combined — two machines in one . . . the "CI", rubber tired complete for trackless operation . . . the "OMC", track type complete, for movement to points of service in regular trips of cars.

Let us furnish you with complete information on the "Cantrell" that suits your requirements best.

For immediate details on the Cantrell "SL" wire or phone Jellico, Tenn., 292.

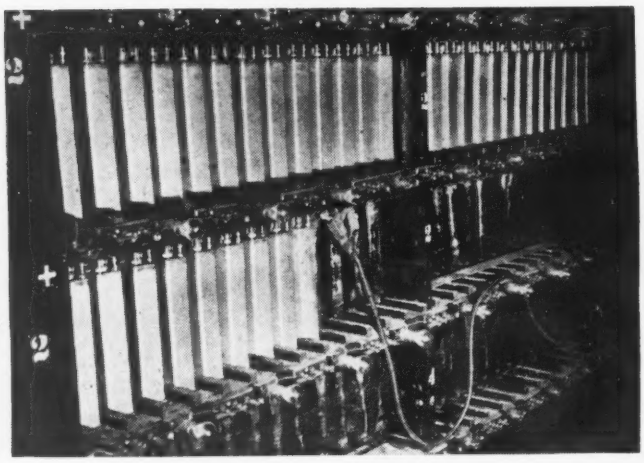


★ *Shown above is the popular Cantrell, Type S-101 Compressor, shipped ready for installation with your own base, air receiver and motor, at only $348.00 F.O.B. plant.*

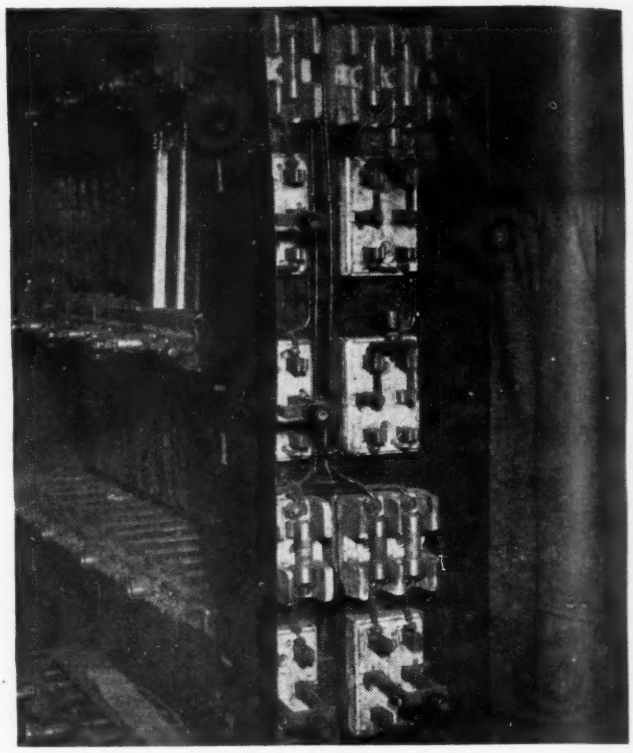
Cantrell COMPRESSORS

IMPERIAL-CANTRELL MFG. CO., JELLICO, TENNESSEE

Lamp Batteries Repaired at Central Shop *(Continued)*



Once the battery cells are placed in the rack, the complete test can be run without having to remove them.



Each shelf circuit is properly fused. The generator is used to charge and discharge the battery cells through the double-pole, double-throw switches.

pletes the circuit for charging all cells in series.

The test procedure, patterned after the "Edison method," is as follows:

Step 1—Discharge cells at 2 amp. for 4 hours.

Step 2—Charge cells at 2 amp. for 12 hours.

Step 3—Same as Step 1.

Step 4—Same as Step 2.

Step 5—Burn down through lamps and record the time that good illumination is had from each lamp.

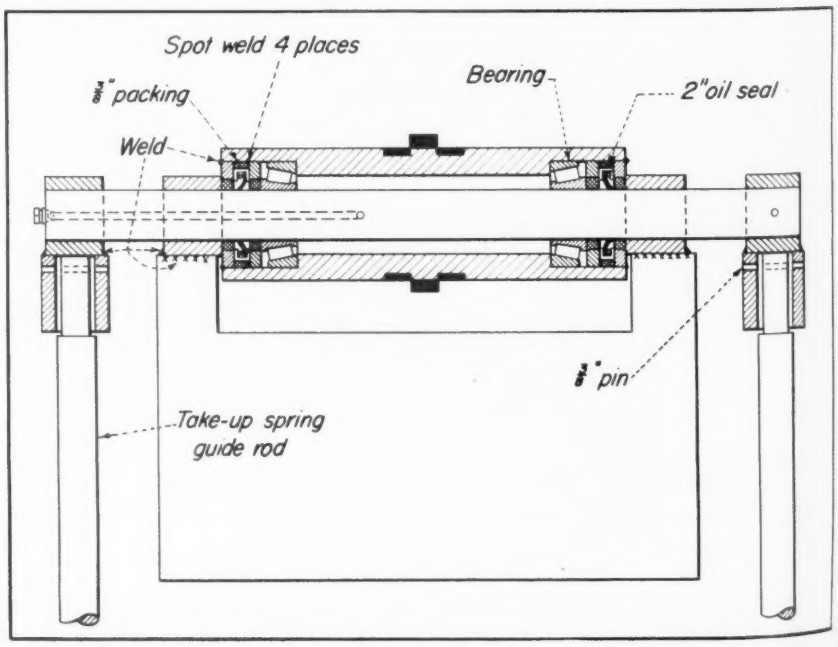
Step 6—If the lamp fails to burn (brightly) for at least 10 hours, then repeat Steps 1 and 2.

Out of a group of 4,200 Edison Model K three-cell batteries in service during 1944, 669 individual cells were repaired at a cost of $2.50 each, labor and material included. After the cells are tested they are delivered to a lamphouse, where they are recanned and put into service again in the mines.

New Design Overcomes Take-Up Roller Trouble

To OVERCOME DIFFICULTIES in keeping the tail or take-up roller turning on the rear conveyor of 7BU loading machines and to insure better lubrication with less attention the roller shown in the drawing was designed, built and installed at Banning No. 1 mine of the Pittsburgh Coal Co., Van Meter, Pa., by John Narbut, master mechanic.

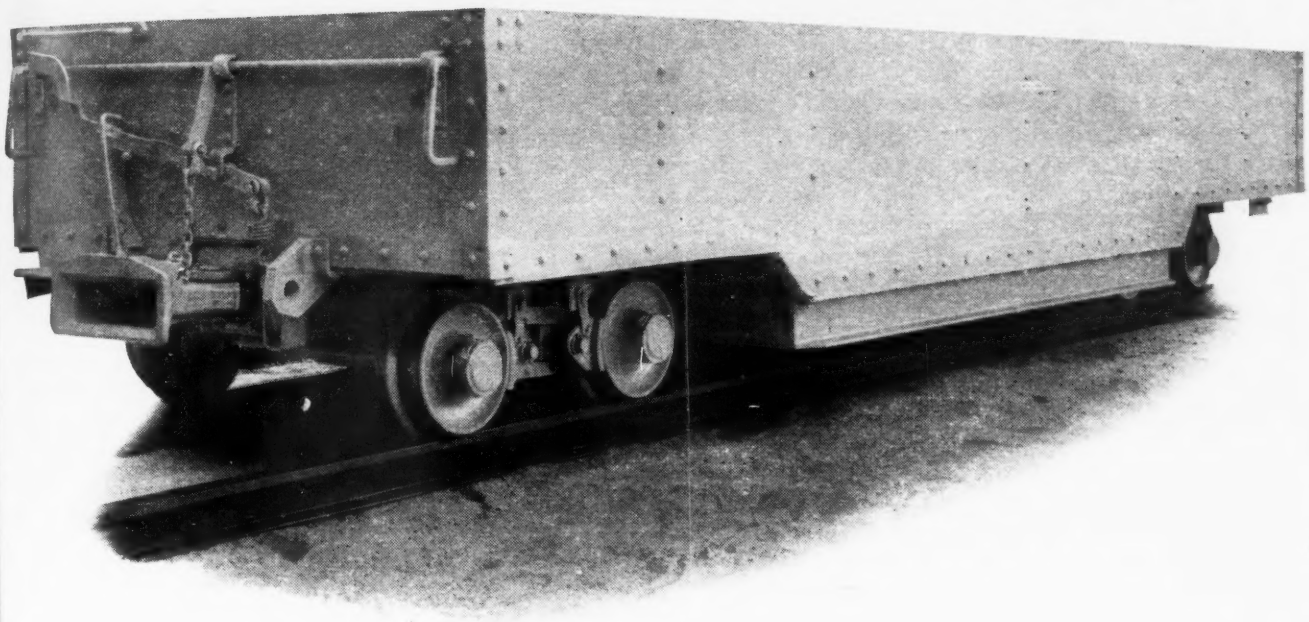
Equipped with roller bearings, fitted with adequate oil seals and provided with a through-the-shaft grease passage to the hub cavity, this roller fulfills the requirements for long life and minimum attention. The packing is $\frac{3}{8}$-in. Garlock, the oil seal No. 3372 of the Chicago Rawhide Co., the bearing cup Timken No. 522 and the cone No. 529 of the same make.



This roller requires little attention and does not get stuck.

why your dollar goes farther in a

BETHLEHEM ALL-STEEL MINE CAR



What are you actually buying when you order a Bethlehem all-steel mine car?

You're buying tops in durability, for no car stands up like a steel car. You're buying years of satisfactory service under tough, unpredictable conditions.

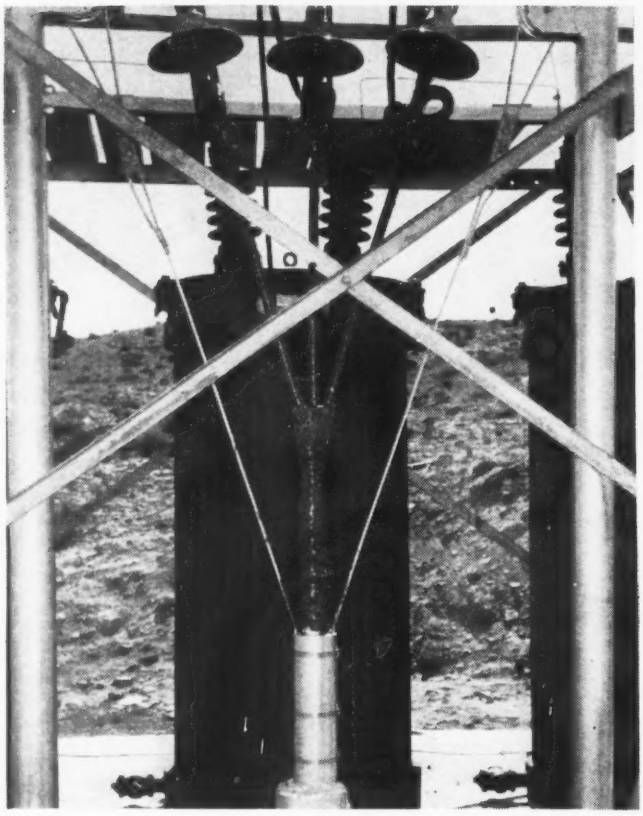
You're buying the utmost in good-running qualities, and you're hitting rock bottom in maintenance costs . . . because a Bethlehem all-steel mine car keeps rolling after other types have given up the ghost.

You're buying undivided responsibility, for Bethlehem builds all-steel mine cars from the wheels up—and stands behind the product.

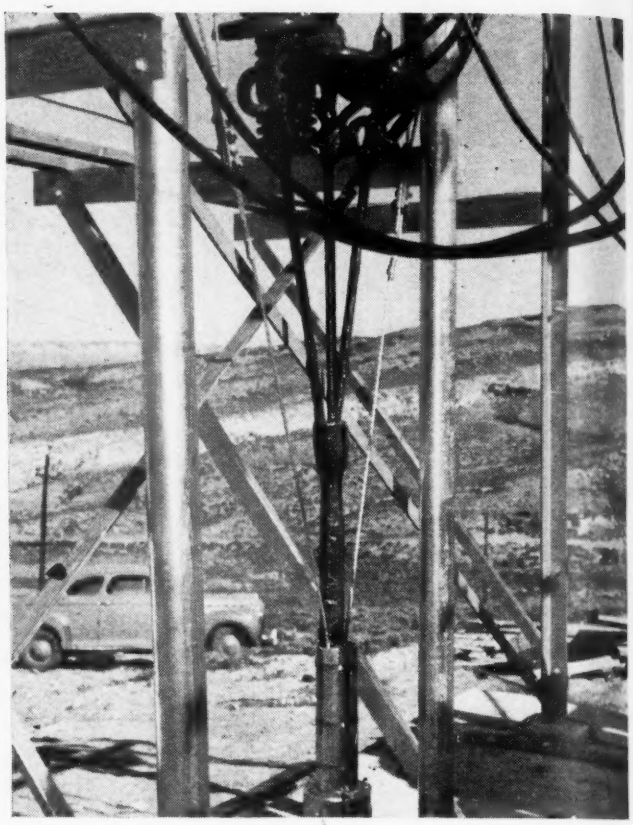
And remember, Bethlehem can furnish you the kind of steel mine car you want—whether rotary-dump, end-dump, high- or low-side types. If you're interested in better haulage at lower cost, check with our engineers. They're old hands at the business of designing good mine cars.

★ BETHLEHEM STEEL ★

Two Steel Cables Support Borehole Cable



Two ⅜-in. steel cables support the weight of the cable in 200-ft. borehole.



Each wire cable is clamped to the power cable at intervals of 5 ft.

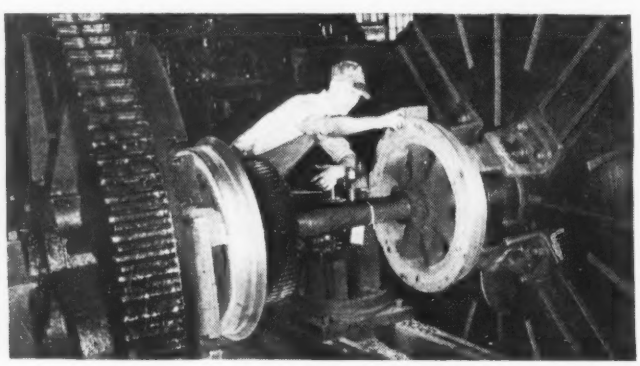
SUSPENDING a portable power cable by two ⅜-in. steel messenger cables, states Guy L. Stevenson, general chief electrician of the Union Pacific Coal Co., Rock Springs, Wyo., makes a suitable substitute for the conventional round-wire armor type of borehole cable.

The cable assembly, shown in the accompanying illustrations, consists of a 3-conductor 4/0 steel-armored rubber-insulated cable supported by two ⅜-in. steel messenger cables clamped at 5-ft. intervals. This cable, by way of a 200-ft. borehole, supplies power for part of the underground system at the Stansbury mine.

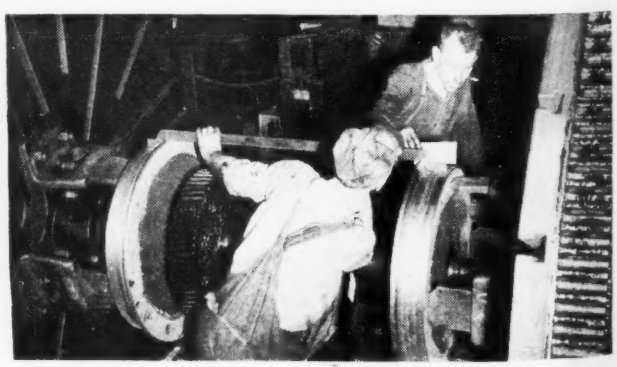
Tires Turned Simultaneously

MACHINING BOTH TIRES on a locomotive truck at once is accomplished in a double-posted wheel lathe at the Central Repair Shop of the Lehigh Navigation Coal Co., Lansford, Pa.

The Niles-Bement-Pond lathe, shown in the accompanying illustrations, will accommodate work up to 6½ ft. in diameter and 8 ft. in spread or length between faceplates. It is primarily used to turn down locomotive tires, whether the tires be on trucks for underground locomotives at the colliery or for standard-gage steam switching engines employed in various surface operations.



William McMichael, machinist, checks the contour of the tread with a template.



Robert Knittle, acting foreman, and William McMichael, machinist, make a final check of the truck wheels.

We build all 4 Material Handling Buckets

PMCO

ALL PURPOSE

- SHOVEL
- PULLSHOVEL
- DRAGLINE
- CLAMSHELL

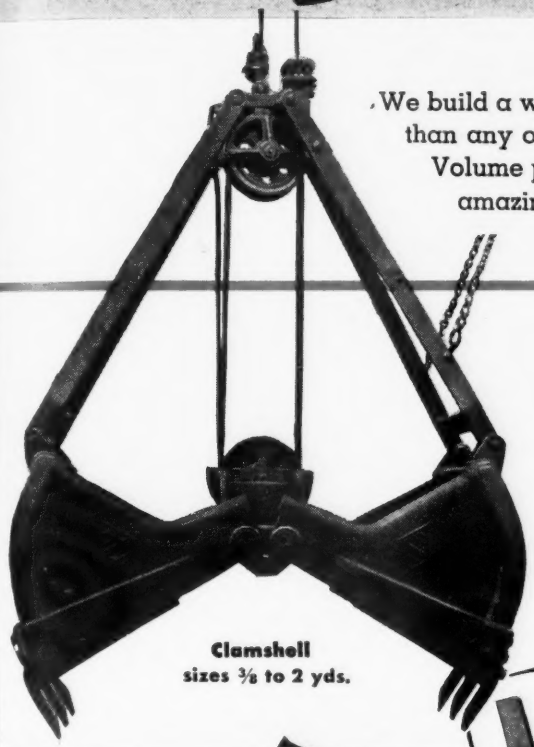
See your shovel engineer or equipment dealer about PMCO dippers and buckets.

AMERICA'S MOST COMPLETE LINE OF MATERIAL HANDLING BUCKETS

We build a wider and more complete line of material handling buckets than any other manufacturer.

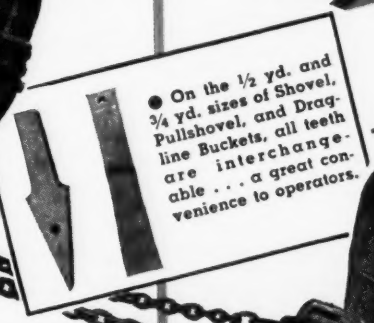
Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

. . . Experience Counts . . .



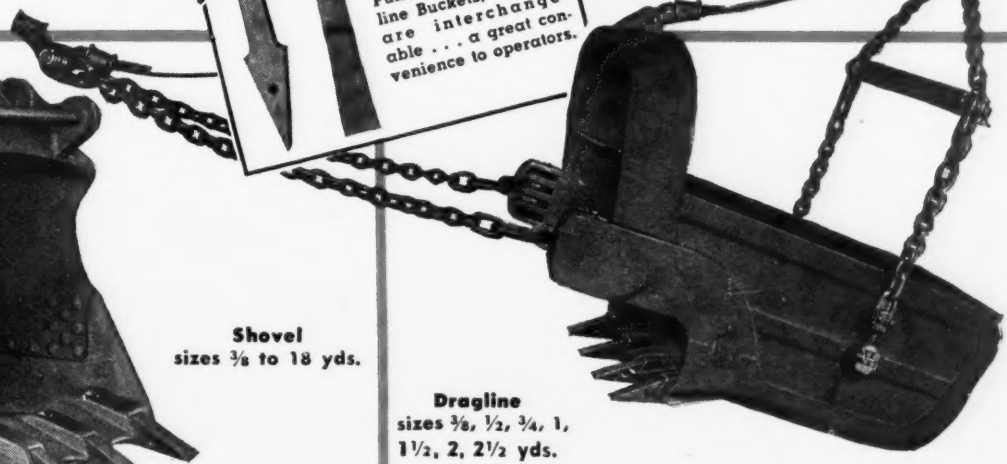
Clamshell
sizes ⅜ to 2 yds.

Pullshovel
sizes ⅜, ½ and ¾ yd.



● On the ½ yd. and ¾ yd. sizes of Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable . . . a great convenience to operators.

Shovel
sizes ⅜ to 18 yds.



Dragline
sizes ⅜, ½, ¾, 1, 1½, 2, 2½ yds.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

Quality Since 1880

PETTIBONE MULLIKEN CORPORATION

4700 West Division Street, Chicago 51, Illinois

Designed FOR MORE COAL PER HOUR

WESTINGHOUSE MINE LOCOMOTIVES

Feature Leaf Spring Construction

EASY OPERATION • LONG LIFE

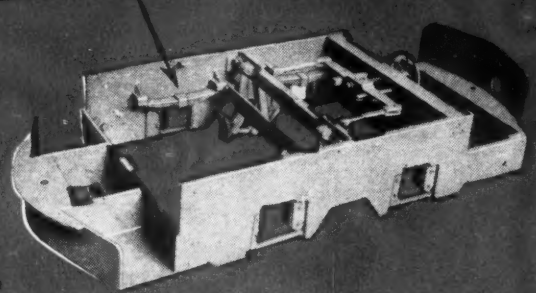
Westinghouse Mine Locomotives are designed to assist you to produce More-Coal-Per-Hour. Built for maximum operating efficiency . . . they will deliver more "on-the-job" haulage . . . with less time out for maintenance and repairs.

Equipment and parts are arranged for easy access to simplify maintenance and inspection. Westinghouse Leaf Spring Construction is one example of many outstanding features designed to make the operator's job easier and prolong equipment life . . . to make your Locomotives available at all times . . . to help you produce More-Coal-Per-Hour.

For full details . . . call your Westinghouse office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-15116

Example: LEAF SPRING CONSTRUCTION

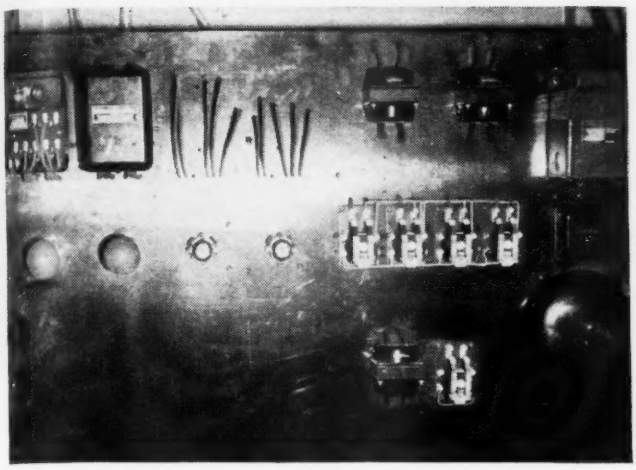
This important feature counteracts the effect of overhung weight and dampens vibrations thus eliminating the galloping or teetering characteristics of locomotives. This is accomplished by mounting the center of the Leaf Spring above the center of the journal box, with the spring extending a considerable distance toward the end of the locomotive.



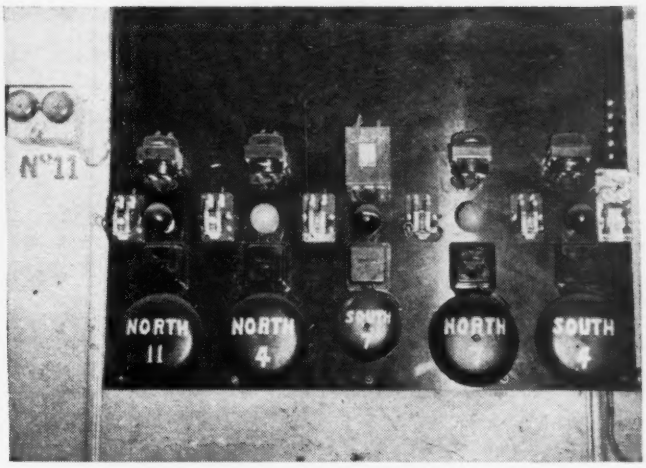
WESTINGHOUSE

Westinghouse *Mine Locomotives*

Electronic Relay Signals Fan Trouble



The electronic relay shown in the upper left-hand corner (cover removed) is an essential part of the Stansbury fan alarm board.



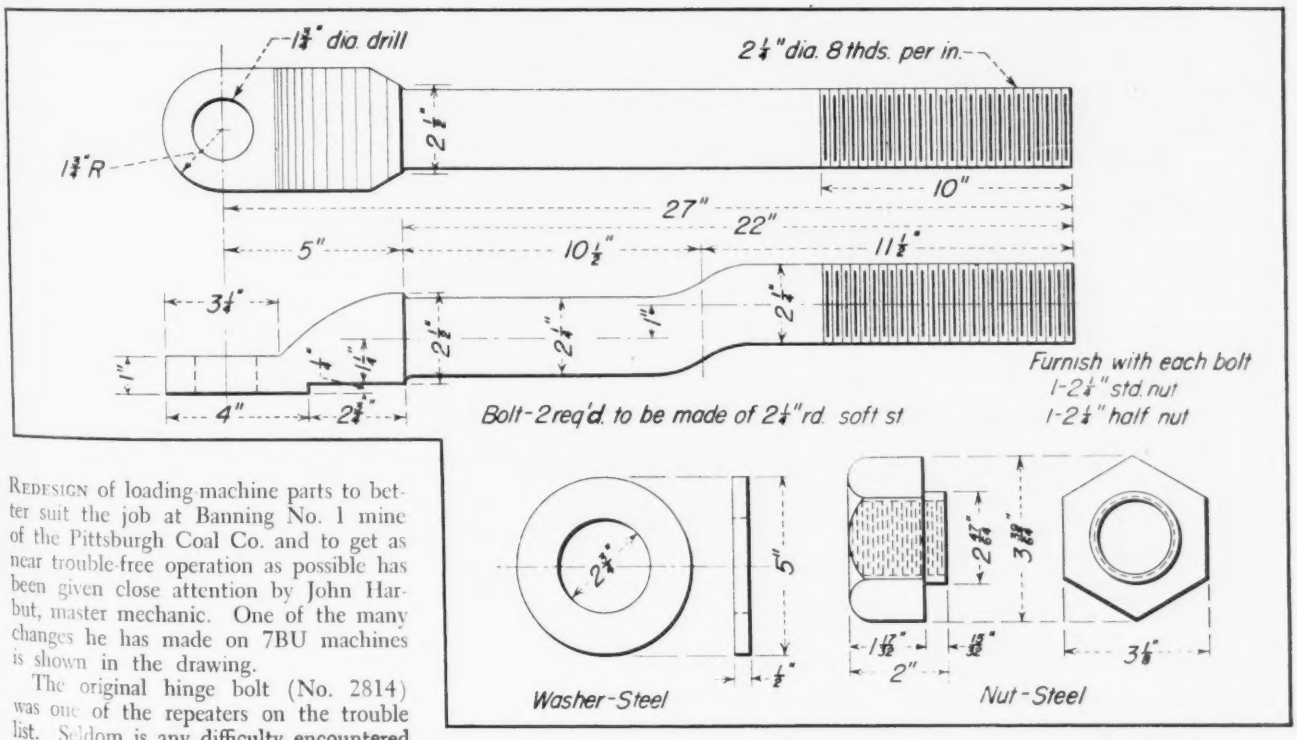
The older form of fan alarm circuit still is in use at the Reliance shop, Reliance, Wyo.

AN ELECTRONIC RELAY is the latest electrical device employed to warn the shop force of fan trouble at the Stansbury mine, Union Pacific Coal Co., Rock Springs, Wyo., according to Kenneth Matthews, chief electrician.

A General Electric Type CR 7511-A111 electronic relay, shown in the accompanying illustration, is being used to check the operation of ventilating equipment more than a mile from the shop. In the old control system, two metallic conductors strung on poles were necessary to get an indication to the shop, where men are always available for answering trouble calls. The electronic relay uses only one metallic conductor with the ground as the other side of the circuit.

The relay is extremely sensitive, attested by the fact that the circuit can be broken and completed again through a person's body (from one hand to the other) and will still function. Likewise, the relay is very fast. It has been known to operate when the actuating contacts made contact for only 0.004 second. The fact that the relay operates on an exceptionally feeble current means that the actuating contacts (the fan switch device) function without pitting, arcing and sticking.

Better Hinge Bolt Improves Loader Performance

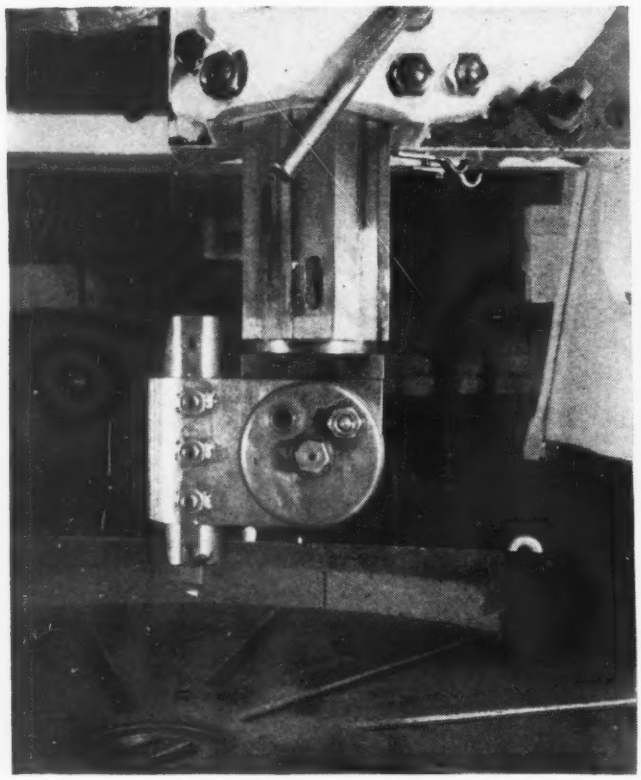


REDESIGN of loading-machine parts to better suit the job at Banning No. 1 mine of the Pittsburgh Coal Co. and to get as near trouble-free operation as possible has been given close attention by John Harbut, master mechanic. One of the many changes he has made on 7BU machines is shown in the drawing.

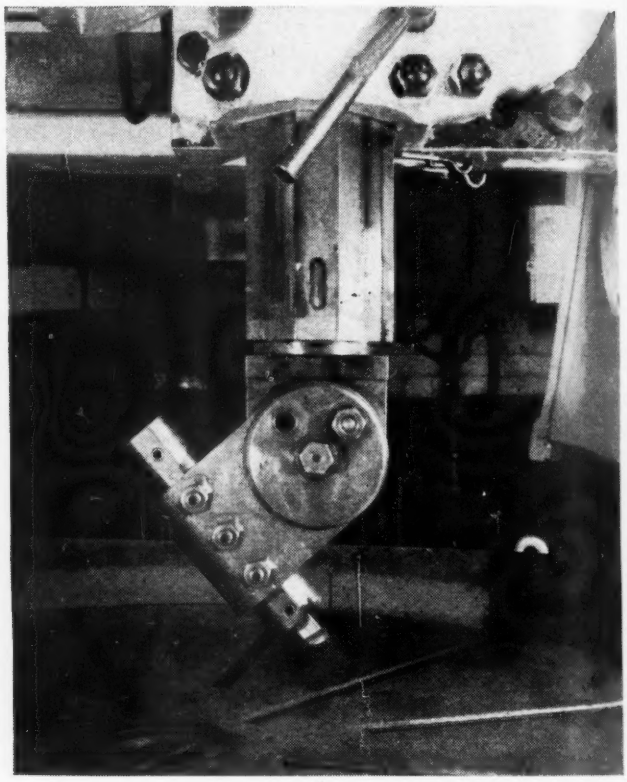
The original hinge bolt (No. 2814) was one of the repeaters on the trouble list. Seldom is any difficulty encountered with the one of new design.

The new hinge bolt with heavy base is made from 2-in. round soft steel.

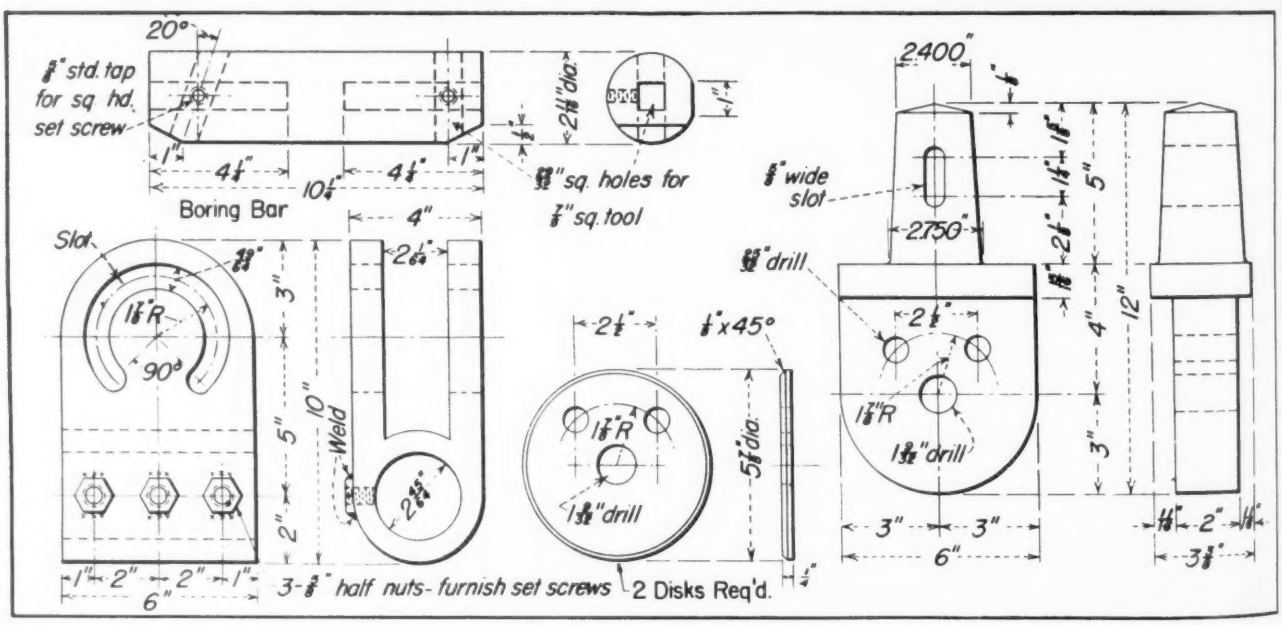
Universal Holder for Boring Mill Saves Time and Tools



Toolholder in one of the vertical positions.



Tool can be clamped at any angle.



Universal toolholder for boring mill.

TOOL BREAKAGE has been reduced and time saved by a universal toolholder devised by Roy Werner Jr. for use on a 60-in. vertical boring mill in the Library (Pa.) shop of the Pittsburgh Coal Co. This mill is used largely for boring locomotive-motor field frames that have been welded to restore worn points to standard. Mr. Werner is now in the armed forces.

The holder is universal and can be used for boring, facing or turning. It can be rotated through 180 deg. and can be fastened in any position by one or two ¾-in. locking bolts. The inclusion of a heavy boring bar, adjustable in the holder, permits use of a short cutting bit. Adjustment of the bar is by ⅝-in. Allen set-screws that are given sufficient depth of thread by welding half nuts on the surface of the holder.

Strong construction of the holder is indicated by the dimensions on the drawing. The boring bar is $2\frac{11}{16}$ in. in diameter and the socket in which it fits is 6 in. long.

Tim Malloy *says* . . .

• We offer you a Bright Christmas with our Wheat Approved Cap Lamp

• And a Safe and Secure New Year with our Koehler Flame Safety Lamp

The management of the Koehler Manufacturing Company and Wheat Lamp Sales, Inc. would like to take this opportunity to wish its many friends a Merry Christmas and a Prosperous New Year.

For over thirty years we have had a single purpose—BETTER MINE LIGHTING—and we wish to thank our many customers in the mining industry who have helped contribute to our success. During the last five years the number of Wheat Approved Electric Cap Lamps in use has increased more than 50%—demonstrating unquestioned confidence in its quality—the service of the maker and the company's strong financial standing.

Again we pledge for the future the same high standards of service and quality of product we have maintained for over a quarter century of serving the mining industry.

WHEAT LAMP SALES, INC.
R. M. LAMBIE, President

KOEHLER MANUFACTURING CO.
K. C. POWNING, Treasurer

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Release Your Production BRAKES...

Production is too frequently slowed up by equipment failure . . . by long shutdowns for maintenance and repairs. Give your men Time Tested trouble free Cincinnati Chains, Bits and Cutter Bars.

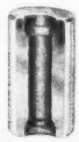
CINCINNATI
DUPLEX CHAIN

Give Your Men *Trouble Free* CINCINNATI CHAINS, BITS and CUTTER BARS . . . . .

There is nothing more important today than dependable, trouble free equipment . . . Cutter Chains, Bits and Cutter Bars that hold up under tough production schedules. Cincinnati Chains are EXTRA TOUGH . . . chains that are engineered not only to reduce excessive wear and tear on the entire cutting machine, but which place the greatest wear on inexpensive easily replaceable parts. Machine runners and bosses alike praise their efficiency while maintenance men say they're practically trouble free. This means a minimum of maintenance and a maximum tonnage at a lower cost.

Easily replaced, hardened alloy steel Connector Insert gives fresh from the factory joint accuracy to worn connector.

Alloy steel, heat treated Rivet holds bearing pin against longitudinal displacement. Easily removed.



Hardened Eccentric Pin puts joint wear between pin and insert . . . doesn't turn in block. With replacement of pin and insert the joint is like new.

THE CINCINNATI MINE MACHINERY CO.

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News Round-Up

Foresees Continued Call for Anthracite

High over-all demand for anthracite through 1950 "possibly surpassing previous wartime peak demands" is indicated by an exhaustive study, according to a statement Nov. 1 by Frank W. Earnest Jr., president of Anthracite Industries, Inc. Addressing a "Victory Conference" of the Fuel Merchants' Association of New Jersey at the Hotel Commodore, New York, Mr. Earnest said it was "entirely probable that the total production of anthracite will be in demand for the next five years."

"The largest single factor affecting tonnage of retail dealers or producers," he said, "lies not in competition but in national income or prosperity, and the tonnage of anthracite has been affected more in any year by this national income curve than all the losses or gains from competition." He contrasted the tonnage drop during the pre-war depression years, when doubling up of families resulted in vacant homes and lower incomes caused lower fuel consumption in occupied homes, with the quick rise in home occupancy during the war, which, with other war causes, brought about "the largest domestic heating load that retail dealers ever experienced in this nation."

If authoritative predictions of a long period of national prosperity are borne out, Earnest asserted, and this is accompanied by a large home-building program, the next several years should see "a high over-all demand for home-heating fuels, possibly surpassing the previous wartime peak demands. This assures that the total retail fuel business in practically all communities will be larger."

Meanwhile, he added, the anthracite industry and the individual producing companies are going forward with "the largest research program in the history of the industry," as well as accelerated merchandising, advertising, and public relations programs.

•

To Push Experiments With Synthetic Fuel

Plans by the government to carry on peacetime experimentation with the production of synthetic gasoline from coal and oil shale at a $17,500,000 converted war plant at Louisiana, Mo., were announced Nov. 25 by Harold L. Ickes, Secretary of the Interior. The work will be directed by the U. S. Bureau of Mines. Having in recent statements called attention to disturbing figures on our diminishing national reserves of natural petroleum, Mr. Ickes stressed the importance of developing methods of producing liquid fuel from coal and other minerals of which we have plenty.

Our coal supply—which he estimated at three trillion tons—was enough, he said, to supply the country with both solid and liquid fuel for at least 1,000 years. America's proved reserves of petroleum, on the other hand, he said, contain only about 20,000,000,000 bbl.

The Missouri Ordnance Works, in which the synthetic gasoline studies will be conducted, was operated by the War Department during the war for the production of synthetic ammonia. It could be converted to the Bureau of Mines' purposes at a saving of several million dollars in construction costs, and would speed up the government's research program on synthetic fuels, said Mr. Ickes.

Containing 390 acres, the plant site—about 100 miles from St. Louis on the Mississippi River—makes possible the testing of coals mined in every section of the country, and for this reason was chosen over more than 200 proposed locations in 21 coal-producing States.

Facilities in the newly acquired plant will be directed to improving methods already developed in this country, and to developing new, and especially cheaper, processes. Engineers and scientists, it has been pointed out, would have full benefit of knowledge recently acquired from Germany, which has made great progress in the conversion of coal to liquid fuel.

Acquisition of the Missouri site is described as part of a five-year, $30,000,000 program authorized by the Synthetic Liquid Fuels Act to develop and make available to private industry the technique for converting American coals and oil shales into gasoline.

•

Fight on Disposal Of Big Inch Pipelines

Contention over the proposed sale of the "Big Inch" and "Little Inch" oil pipelines broke out Nov. 17 as opposing interests argued before a Senate committee

"Boss, I think we better go down. Last couple times I've called O'Rourke, what came up sounded like Chinese."

investigating petroleum resources. Extending from east Texas oil fields to the New York area, the lines were built by the government at a total cost of $138,000,000 when German submarines were taking a heavy toll of tankers.

Representatives of Texas oil and gas producers and a New Yorker disclosed plans to buy the pipelines for use in moving natural gas.

F. F. Estes, traffic manager of the National Coal Association, urged that in all fairness these emergency facilities ought not to be turned over to private industry, thereby giving unfair competitive advantage to the gas or oil interests that might acquire them. Speaking in behalf of the coal industry, he contended that the lines should be retained by the government for emergency use. Other speakers for the coal industry and railroads declared that plans to move gas would adversely affect as many as 2,500,000 miners and railroad workers and members of their families. Gas would displace present demands for coal and railroads would have less tonnage to carry, they asserted.

D. Heywood Hardy, an attorney, announced that a group in Texas, headed by Harold Byrd, was ready to spend $20,000,000 immediately to establish booster stations to move gas from Texas fields to the New York and Philadelphia areas. The Texans were reported to have $10,000,000 to put up for the purchase.

A committee of the petroleum industry headed by B. I. Graves, vice president of Tidewater Associated Oil Co., recommended that the lines be converted to natural-gas service or held in military reserve, but should not be operated by the government in competition with the petroleum industry. The industry's committee stated the pipelines could not be operated economically to carry petroleum by the government and that the end of the war had made ample and efficient tanker, pipeline and other industry-owned facilities available, which were cheaper to operate.

As a representative of Rogers Lacy, Longview, Texas, Claude Williams stated that Mr. Lacy, either as an individual or in cooperation with other Texas oil and gas producers, was interested in purchasing the pipelines to transport gas. He said the intention of Mr. Lacy and his associates was to operate the pipeline as a public carrier and that they would make it available to independent and major producers alike. He disclaimed any intention of entering the gas-distribution business in the East, asserting that would be left to existing companies.

Charles H. Smith, New York, a consulting gas engineer, told the committee he was authorized to speak for a group of New York men who were interested in purchasing the pipelines to transport gas to that section of the country. He identified his associates as Dr. James Bonbright, member of the New York State Power Authority; C. Ross Holmes, former gas expert of the New York Public Service Commission; Dr. John Bauer, utility economist; Paul Moses, engineering consultant for the city of New York, and Oscar L. Cox, a Washington attorney.

Appearing for the Association of American Railroads, J. M. Souby, general counsel, cautioned the committee to look into effects of utilization of the pipelines for gas would have on rail carriers. Should railroad revenues be reduced through a falling off of coal loadings, which was inevitable if the pipelines were converted, the railroads probably would have to increase freight rates, he said.

Speaking for the United Mine Workers, Welly Hopkins declared that the Big Inch and Little Inch should be filled with oil and shut off so that they could be ready for prompt government use as oil carriers in event of an emergency. He said it was unwise economy to transport more fuel to an area where coal was abundant. He estimated that up to 2,500,000 workers and members of their families would be affected by use of the lines for gas. Similar views were expressed by F. C. Wright, representative of the anthracite industry, and O. E. Schultz, of New York, representing Eastern railways.

The Combined Chiefs of Staff of the Army and Navy recommended to the Senators that the government sell the pipelines. Brig. Gen. Howard Peckham, representing the military and naval leaders, told the group that the pipelines should be disposed of to private interests with a recapture clause enabling the government to regain them in event of a future emergency.

COAL ACTIVITY

Bituminous Coal Stocks

	Thousands Net Tons Oct. 1 1945	—P.c. Change— From Sept. 1	From Oct. 1 1944
Electric power utilities	15,534	+5.7	−12.6
Byproduct coke ovens	4,624	+2.7	−25.0
Steel and rolling mills	746	+9.7	−5.7
Railroads (Class I)	10,880	+4.7	−26.3
Other industrials*	16,241	+3.4	−17.2
Total	48,025	+4.5	−18.8

Bituminous Coal Consumption

	Thousands Net Tons Sept. 1945	—P.c. Change— From Aug. 1945	From Sept. 1944
Electric power utilities	5,316	−11.6	−20.0
Byproduct coke ovens	7,130	−0.7	−6.2
Steel and rolling mills	673	−2.9	−16.6
Railroads (Class I)	9,253	−4.9	−8.3
Other industrials*	9,851	−0.9	−26.2
Total	31,550	−6.0	−22.0

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

October, 1945, net tons	38,580,000
P.c. change from October, 1944	−25.5
January-October, 1945, net tons	476,418,000
P.c. change from Jan.-Oct., 1944	−9.07

Anthracite Production

October, 1945, net tons	5,259,000
P.c. change from October, 1944	−5.0
January-October, 1945, net tons	46,093,000
P.c. change from Jan.-Oct., 1944	−14.9

Sales, Domestic Stokers Vs. Oil Burners

	Stokers	Burners
September, 1945	14,319	13,434
P.c. change from Sept., 1944	+268.9	+412.0
January-September, 1945	71,626	59,682
P.c. change from Jan.-Sept., 1944	+201.1	+178.7

Index of Business Activity*

Week ended Nov. 24	167.9
Month earlier	158.4
Year earlier	230.7

* *Business Week*, Dec. 1.

Electric Power Output†

Week ended Dec. 1	4,042,915,000
P.c. change from month earlier	−7.2
P.c. change from year earlier	−10.6

† Edison Electric Institute.

F.P.C. to Hold Hearings on Gas Lines

A series of four hearings on proposed gas lines is to be held by the Federal Power Commission. The Northern Natural Gas case, scheduled for hearing Nov. 28, involves four dockets including proposals to construct about 250 miles of loop lines to increase daily deliveries in territories already served in Kansas, Nebraska, Iowa and Minnesota; construction of a small line to serve Webster City, Iowa; construction of lines to serve Belle Plaine, Jordan, Janesville and Dunnell in Minnesota; Madrid, Granger and Grimes in Iowa; and Murdock in Nebraska. Coal equivalent of the natural gas is about 750,000 tons per year.

Concerning the Natural Gas Pipe Line Co. and Chicago District Pipe Line Co. a hearing was to be held Dec. 10 on two dockets seeking permission to construct facilities to bring an additional 80,000,000 cu.ft. of gas per day to the Chicago and northern Illinois market area. Coal equivalent of the additional gas that would be brought to the northern Illinois market is about 1,500,000 tons per year.

In the Michigan-Wisconsin Pipe Line Co. case a hearing will be held Jan. 8 on an application for authority to construct 816 miles of 26-in. line and 400 miles of 22-in. line from the Hugoton field of Texas to deliver gas to Milwaukee, Madison and other towns in Wisconsin and to take natural gas for the first time or increase natural-gas deliveries to Des Moines, Iowa City and 39 other communities in Iowa; Rock Island and Moline, Ill.; Detroit and other communities in Michigan. Coal equivalent of the additional gas would be about 3,500,000 tons annually.

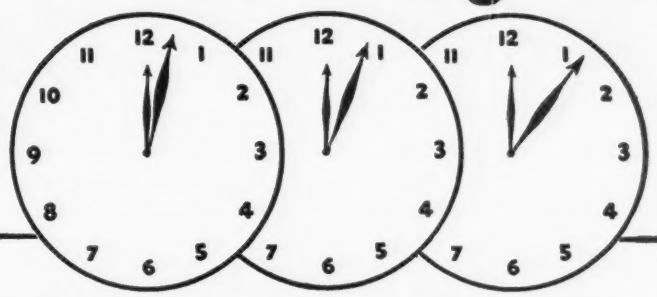
The Metropolitan-Eastern Gas Co. proceeding, to be heard Jan. 15, involves application to build an 18-in. line 825 miles long from the Carthage field of Texas to a point near Hamilton, Ohio, to make additional gas available for distribution in the Appalachian area. This project would bring additional natural gas equivalent to about 2,500,000 tons of coal annually.

Louisiana Governor Objects to Gas Inroads

Governor James H. Davis of Louisiana, testifying Nov. 12 before a Federal Power Commission hearing at New Orleans into the supply and uses of natural gas, said that Louisiana "objects strenuously to pouring the enormous volume of our remaining supply of natural gas into States that have other fuels." He named these States as Alabama, Tennessee, West Virginia, Ohio, Pennsylvania "and other Appalachian States."

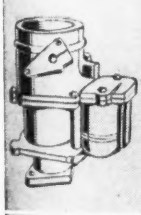
The Louisiana executive said they "have

How to Cut Metal Cleaning Time to MINUTES



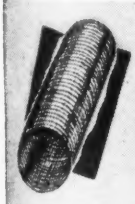
NEW, FAST-ACTION DETERGENT CLEANS FERROUS AND NON-FERROUS METALS...Easy to Handle

TYPICAL USES FOR Solvent "26"



CARBURETORS—Solvent "26" removes gum, gasolene sediment and other accumulations of dirt.

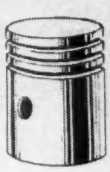
SPARK PLUGS—Solvent "26" safely cleans porcelain; helps loosen carbon deposits.



METAL PLATES AND SCREENS—Solvent "26" restores clear, clean finish to any metal surface.

DIES AND STAMPING—Solvent "26" removes drawing compounds from die-formed or stamped metal.

LABORATORY EQUIPMENT—Solvent "26" frees glass and metal tubing and their supports of gums, varnishes and other incrustations or deposits.



PISTONS—Removes lacquers, gums, resins, etc. from gas, gasolene and diesel engine pistons and rings. Also effective for cleaning all parts of dismantled motors, engines and machinery.

REMOVES:

Oil • Grease • Gums • Varnishes • Lacquers • Paints
Carbonaceous Deposits • Asphaltic Products

FROM:

Steel • Cast Iron • Aluminum • Porcelain • China
Chrome and Nickel Plate • Stone • Precious Metals
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Used throughout the war in critical industry as a superior cleaning agent, newly-developed SOLVENT "26" is now available for all industrial needs.

Offering many advantages in time, labor and cost over other present cleaning methods . . . Solvent "26" is so effective a detergent it can be used at *ordinary* room temperatures.

The fast action of Solvent "26" reduces cleaning time from hours to minutes on dismantled engine parts and all kinds of machinery. Simply dip, rub, brush or spray it on. Then flush clean with hot water.

Mail the coupon today for literature and information leading to a demonstration of this unique product in your own plant.

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Gentlemen: I am interested in a demonstration of Solvent "26"—at no cost or obligation.

Name.....

Title.....

Company.....

Address.....

City.....State.....

almost limitless reserves of coal and many of them also produce natural gas and petroleum." He said he agreed with a report made by the F.P.C. in 1940 that condemned the use of natural gas for steam boiler heating, but that he believed exceptions might be made for States that have no other fuels.

•

Stream Pollution To Be Considered

Hearings are to be held soon on the various stream-pollution-control bills presented to Congress, according to Representative Joseph J. Mansfield (D., Texas), chairman of the House Rivers and Harbors Committee. Some of the proposed legislation would set up a new agency in the U. S. Public Health Service to devise means of pollution control by the Army Engineers. Federal loans to carry out the program would be necessary.

•

U. S. Steel Opens New Coal Operation

United States Coal & Coke Co., subsidiary of the United States Steel Corp., began operation of a new coal mine Nov. 1 in a 9-ft. seam outcropping on Elkhorn Mountain, near Gary, W. Va. The operation is 800 ft. above the valley floor and 2,200 ft. above sea level and an inclined railway 1,000 ft. long built on a 50-percent grade is used to haul the coal to railway cars at the bottom of the mountain. It is completely mechanized and trackless; a conveyor belt will be used to transport the coal as operations become deeper. About 1,200 tons a day will be produced, which, with that of two other mines projected in the Pocahontas field, will be used in the Chicago, Lorain (Ohio) and Cleveland coking plants.

Development of a 67,000-acre tract in Greene County, Pennsylvania, known as the Robena mine, will be one of the largest in the world.

Safety, Lubrication and Equipment Feature Record Illinois Meeting

WITH the highest registration in its history—more than 600—the Illinois Mining Institute began its reconversion program for the coal-mining industry Oct. 26 at the Abraham Lincoln Hotel, Springfield, Ill. The papers presented included safety and mining, explosives in coal mining, coal-mine lubrication, evolution of cutting machinery, and the work of the Mining Electrical Group of Southern Illinois.

President George F. Campbell, Old Ben Coal Corp., in calling the meeting to order, stated that Illinois holds third place in coal production, referred members to the Year Book for the minutes and piloted the election of new officers and four new members of the executive board.

A report from the scholarship committee from Prof. H. L. Walker noted that there are still 1,400 students of the University of Illinois in the armed service; of the present students in the mining course, three are veterans; that at present there are no active scholarship mining students, and that prospects are not good.

At the morning session, presided over by T. J. Thomas, president of the Valier Coal Co., the first paper, "Safety and Mining," was presented by Robert Weir, assistant director, State Department of Mines and Minerals. Mr. Weir asserted: "Reports tell a gratifying story of safety in mining in Illinois. The war placed old men in jobs, but it is not so true that they are a liability, nor entirely true that an increase in tons produced and days worked need increase accidents."

Despite a 36-percent increase in wartime tonnage for the five years 1940-44 over the five years 1934-39 and the working of older men to make up some of the loss in manpower due to inductions into war services, the tons per fatality rose from 566,199 to 713,058. However, average men employed in the 1934-39 period was 45,832 against 33,306 for the 1940-44 period.

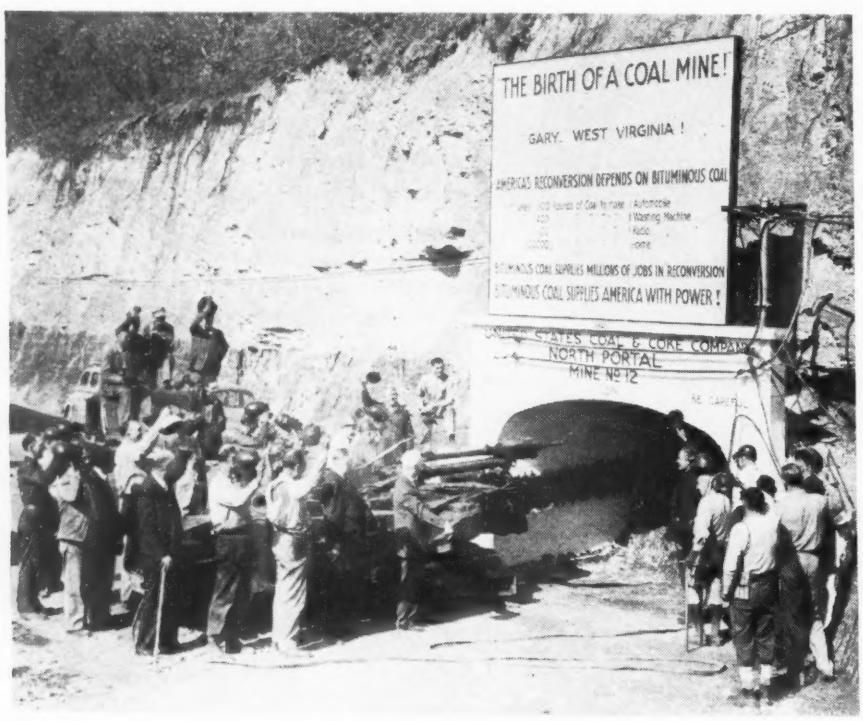
Discussion by T. J. Thomas brought to light that some fatalities might not be due to mining conditions but because of preoccupation of men worrying about their boys in the war theater. He told of a personal experience bearing this out.

The second paper of the morning session was "Explosives in Coal Mining," by N. G. Johnson, Technical Service Section, E. I. duPont de Nemours & Co., Wilmington, Del. The speaker traced the improvements in explosives for mining from black powder, about the year 1650, to the invention of dynamite by Alfred Nobel in 1867 and on down to 1908, when the U. S. Bureau of Mines erected a "testing gallery," which brought out 36 permissibles from explosives manufacturers the following year. The testing gallery was the key to the solution of the problem of producing an explosive that would not ignite gas or dust. Research had already prepared manufacturers for taking advantage of its findings.

"The big question is, Are permissibles safe?" Mr. Johnson declared: "The average permissible has a factor of safety of 17 over common dynamite and 45 over blasting powder." The Bureau of Mines says: "No permissible explosives, when used in a permissible manner, have caused an ignition of either gas or dust." In the entire history of permissibles they have figured in but 19 explosions; in each case at least two non-permissible practices were in effect. This record involves 1,500,000,000 lb. of permissibles.

The criticism of too high speed has been overcome by adding coarse ammonium nitrate and by modifying the construction of the sticks. Lack of waterproofing has been overcome by permissible and semi-permissible gelatin. New waterproofing methods have produced a low-velocity permissible for coal that can be loaded under water at the beginning of the shift and fired at the end of the shift.

Much has been done to make handling of explosives safer in strip mining, mainly by substituting ammonium nitrate for nitroglycerin. Such explosives are available in a wide range of speeds for all types of overburden. Low-cost water resistance is provided by composition or packaging.


THE BIRTH OF A COAL MINE!
GARY, WEST VIRGINIA!
AMERICA'S RECONVERSION DEPENDS ON BITUMINOUS COAL
BITUMINOUS COAL SUPPLIES MILLIONS OF JOBS IN RECONVERSION
BITUMINOUS COAL SUPPLIES AMERICA WITH POWER!
NORTH PORTAL
MINE No 12

Cutting machine makes first cut in new mine.

HAZACORD PORTABLE CABLES

COME THROUGH

WITH *4-FOLD* RESISTANCE

Locomotive reel cables and mining machine cables are constantly subjected to the effects of flame, oil, water, soil chemicals and to the abuse of continual dragging across rough surfaces. Hazacord cables are rugged. They are sturdily built for the toughest jobs. Every type of Hazacord cable is constructed to withstand harsh service over a long period of time.

FLEXIBILITY — Fine gauge rope-laid wire conductors, fillers and insulation provide maximum flexibility for easy handling. Hazacord cables slide smoothly over, and slip around obstructions, resisting the rubbing and scraping of hard jagged surfaces which ordinarily cause abrasion.

INSULATION — Hazard standard rubber insulation of high tensile strength resists the tendency to "short" under abuse. Conductors are colored for identification.

FLAME RESISTANT JACKET — One important safety feature of the Hazaprene jacket is that it does not support combustion, rendering the cable flame resistant. It is, moreover, highly resistant to oil and grease as well as moisture — and all Hazacord mining cables are mold cured for the greatest possible density and toughness. For several years the Hazaprene jacket incorporating all these features has been standard on all Hazacord Mining Machine Cables, Locomotive Reel Cables and Electric Shovel Cables.

Even having these extra qualities, Hazacord cables are available without extra cost. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

Hazacord Portable Cables are available in many forms such as twin parallel, concentric and two conductor round. Send for 8-page bulletin "HAZARD MINING CABLES" Just out!

ARMY E NAVY

HAZARD

Insulated wires and cables for every mining use

Referring to a paper on "On-Shift Shooting," by Howard Lewis, read before the institute in 1942, Mr. Johnson said: "Off-shift shooting loses a substantial amount of coal, with penalties still greater in the future. Proponents of off-shift shooting say, 'In event of a mine explosion, fewer men are involved.' That is obvious," admitted Mr. Johnson, but "the record of permissible explosives indicates that if they were used exclusively in a permissible manner there would be no mine explosions."

In closing Mr. Johnson asserted: "Economy and safety favor on-shift shooting. Illinois operators should make an effort to have the (off-shift) law repealed."

In a very brief discussion, Howard Lewis, underground superintendent for the Old Ben Coal Corp., happy to have his 1942 stand upheld, said: "On-shift shooting reduces accidents from roof and coal falls. These are half the total fatal and non-fatal injuries."

At the afternoon session, presided over by Howard Lewis, "Coal-Mine Lubrication" was discussed by Arthur M. Hughes, Superior Coal Co., Gillespie, Ill. "Modern mechanization has changed lubrication methods and theories just as much as it has changed mining systems in general," declared Mr. Hughes. Continuing, he said: "Lubrication and maintenance are interdependent. Efficient systems can be wrecked by deficient maintenance." Two systems are in effect in Illinois mines: cheap oil with frequent changes; high-cost oil and longer use by reclaiming.

A lubrication supervisor is recommended for operations large enough to justify the expense. In any event, training of employees in maintenance and lubrication are recommended. It dignifies lubrication in the eyes of employees.

Lubrication should be performed by modern methods and with modern equipment. A lubrication chart for each machine, marked high-pressure containers and application when needed, not necessarily on idle shifts, are some of the means of doing a good job of lubrication. It is better to underlubricate than overlubricate. Measuring devices and records are helps to economy and efficiency.

Since there is a lubricant for every purpose, expert opinion should be had in making the choice. Maintenance and lubrication go hand in hand. Oil seals must be replaced when needed, gaskets used for bolted sections and alignment of parts carefully checked. This all results in increased production at lower cost.

Discussion by L. G. Hazen, Socony-Vacuum Oil Co., Pinckneyville, Ill., brought the statment that "benefits are not measured in cost of lubricants alone but are the sum of several factors: maintenance cost lower, production improved, power losses lower, lubrication costs less."

Training helps. "Attainment requires the right lubricant applied in the right way at the right place. That requires a program and the responsibility of someone. Lubrication is a matter of teamwork and is not a routine job."

Determine the proper oil or grease to insure maximum economy. Records are simplified by using the smallest variety of lubricants that will give adequate protection.

Rod Eagan, Goodman Mfg. Co., Chicago, read a paper, "Evolution of Coal-Cutting Machinery," that outlined the growth of coal-cutting machines and some of the outstanding developments in that process. Beginning with the air puncher in 1880, the Sperry electric puncher followed in 1887-9. This converted rotary motion into a hammer blow by compressing a spring, to be suddenly released. Not satisfied, Sperry built a continuous cutter in 1890. During the following ten years various manufacturers developed several chain breast machines. During the first decade of the new century the trend was to overcutting for dirt bands and weak top.

Slabbing machines came in 1915; refinements began in 1920 and lower shortwalls by 1930. During the period 1930-40 cutting was correlated with other mining operations, mobile cutting machines coming into fashion. Many modern improvements were made during this period, including hydraulic control, faster speeds, longer cutter bars, improved chains and better means of handling cuttings.

"Today," said Mr. Eagan, "more than 90 percent of our coal is mechanically cut, and it is at its highest standard of efficiency."

The paper "Mining Electrical Group Begins Ninth Year," by Fred W. Richart, *Coal Age*, Carterville, Ill., told of the organization, management, advantages and accomplishments of this highly successful educational society. It has done much to lift the mining industry of southern Illinois to a higher level of efficiency and to make all operatives aware of the care in operation and maintenance that modern mining machinery must receive to permit the coal industry to hold its place in the fuel field.

The high standard of the papers, the continued high attendance and growing interest in the meetings speak well for the value of the society. In spite of gasoline shortage and other war restrictions, not a meeting has been cancelled. Ladies' Night, once a year, adds much to the glamour and the social interest that none would like to forego.

Discussion by T. L. Garwood, assistant superintendent, New Orient mine, emphasized the value of monthly as compared to annual meetings. "Friendships and confidence stress the educational value and the advantage of frequent meetings."

Frank Eubanks, maintenance engineer, Old Ben Coal Corp., in further discussion, stated: "All types of programs from gears to electronic rectifiers are sponsored by the largest industrials in the country in an informal atmosphere." He testified, "We feel that the Mining Electrical Group has made a worth-while contribution to the mining industry by lifting the level of education of the men in the mines."

The meeting closed with the annual banquet, at which Richard F. Wood, Belleville Fuels, Inc., Belleville, Ill., was toastmaster and Holly Stover, president, Chicago & Eastern Illinois R.R., was the guest speaker. Mr. Stover stressed the desire of the railroads to help the coal industry overcome some of their marketing difficulties and the need for the country to inject some sanity into all the walks and talks of life.

A highly interesting feature of the dinner program was a birthday cake, with burning candles, presented to the newly elected president, Joseph E. Hitt. Mr. Hitt was greeted with resounding applause. He finally admitted there were 69 candles. Several life memberships, including several railroad presidents, were added to the roll. The membership of the institute now stands above one thousand.

ILLINOIS OFFICERS, 1946

President—Joseph E. Hitt, vice president, Walter Bledsoe & Co.

Vice President—R. M. Medill, director, State Department of Mines and Minerals.

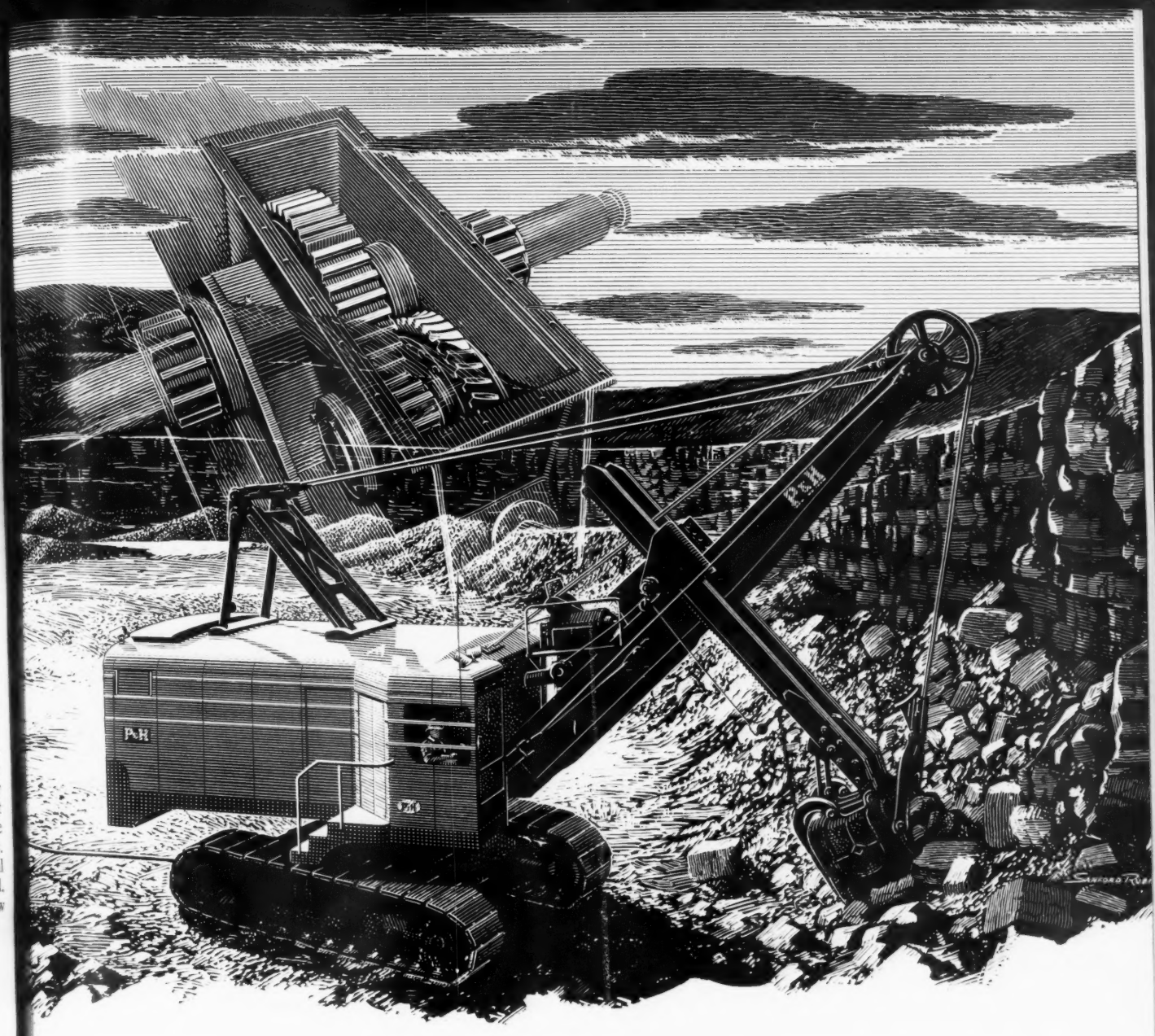
Secretary-Treasurer—B. E. Schonthal, B. E. Schonthal & Co.

Executive Board—R. L. Adams, Old Ben Coal Corp.; Alex Duncan, Superior Coal Co.; Paul Halbersleben, Sahara Coal Co.; G. S. Jenkins, Consolidated Coal Co.; E. R. Keeler, Franklin County Coal Co.; L. F. Lumaghi Jr., Lumaghi Coal Co.; Harry M. Moses, H. C. Frick Coke Co.; H. A. Reid, United Electric Coal Cos.; J. W. Starks, Peabody Coal Co.; E. F. Stevens, Pyramid Coal Corp.; H. A. Treadwell, Chicago, Wilmington & Franklin Coal Co.; W. P. Young, Bell & Zoller Coal & Mining Co.

Reports Amended Labor Disputes Act

Repeal of the provisions of the Smith-Connally War Labor Disputes Act that give the President power to take over strike-bound plants and that require the National Labor Relations Board to take secret strike ballots features an amended version of H.R. 3937 favorably reported Oct. 30 by the House Military Affairs Committee. The measure includes two important affirmative provisions, one penalizing unions that fail to live up to no-strike contracts and the other strengthening the present ban on the employment of union funds for political purposes.

The new anti-strike provision contained in the bill as reported would relieve an employer from all contract liability "in the event of any strike or concerted failure or refusal to work during the life of a collective bargaining contract that includes a no-strike provision"; also, the union would lose its status as a bargaining agency for one year and would be responsible in damages for a breach of contract. The provision dealing with the prohibition of political contributions by labor organizations seeks to close loopholes in the existing statutory ban.



How We Keep A Fast Crowd In Line

Here's a *fast crowd* that doesn't give trouble--not the way P&H builds it!

It's plain to see why the crowding action of P&H Electric Shovels is so much livelier — more responsive and powerful. Conical worm gear drive cuts inertia to a minimum — permits the most compact gearing unit possible. Only very short shafting is required; overhung gearing is eliminated. Every ounce of power from the independent crowd motor flows smoothly to the dipper sticks for *snappier* crowding — *faster* retracting.

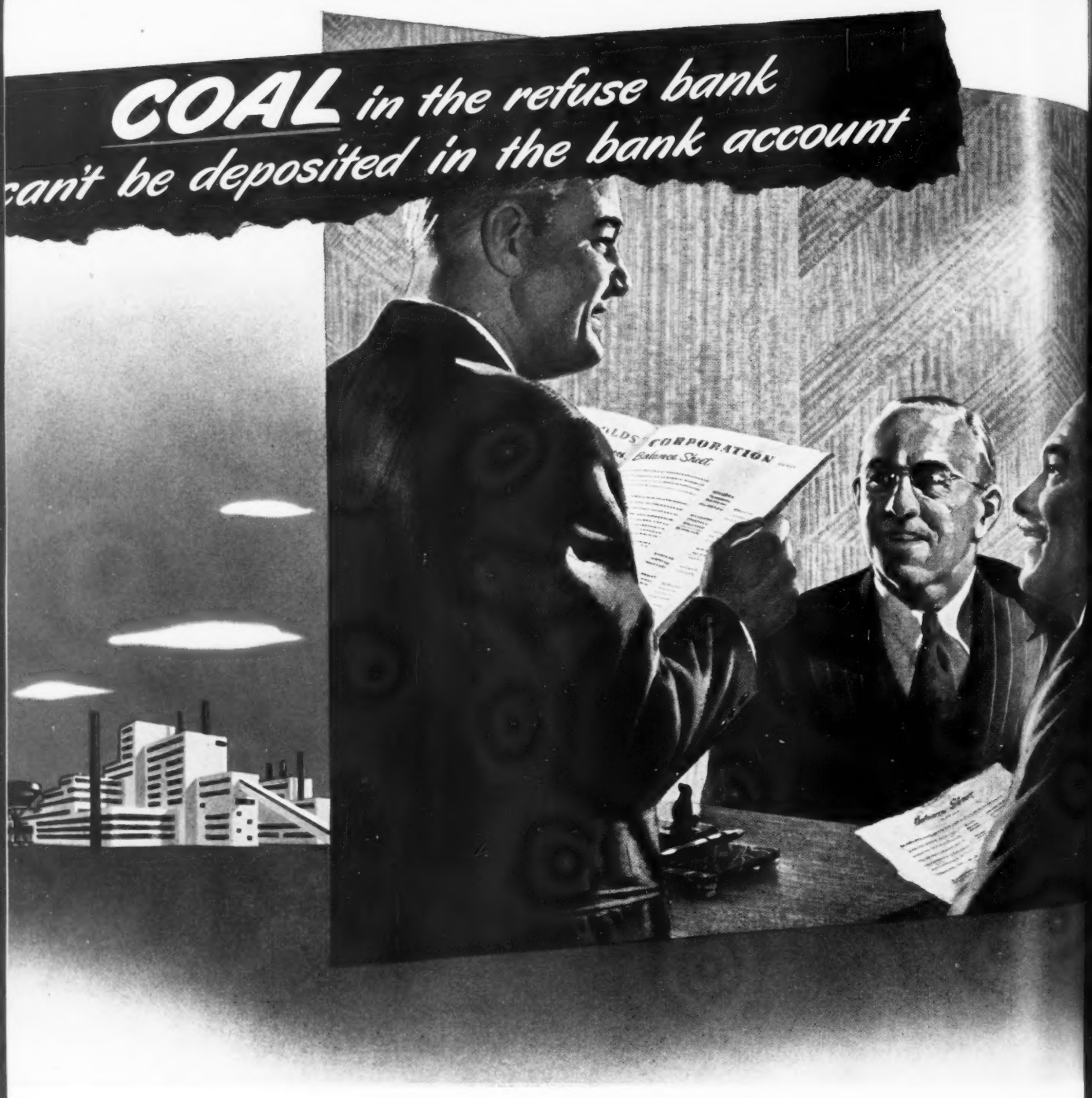
P&H engineers increase the advantages of the compact, flood-lubricated gear case design by building it integral with the boom. Welded-in construction adds to boom rigidity and strength, while integral shipper shaft housing prevents bearing movement and torque on the boom. The net result in any open-pit operation is bigger and steadier production.

This faster, more dependable crowd is another example of the advanced engineering and simplified design that mark the new P&H Electric Shovels as the greatest forward step in electric shovel history. Behind them is P&H's 60-year leadership in applying electrical power to the movement of heavy loads.

P&H ELECTRIC SHOVELS
4454 W. National Avenue
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION
EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · HOISTS · WELDING ELECTRODES · MOTORS

THE GREATEST FORWARD STEP EVER MADE IN ELECTRIC SHOVEL DEVELOPMENT

COAL in the refuse bank can't be deposited in the bank account



Coal saved from the refuse bank shows up as profit when the annual report is discussed in the directors' meeting. It frequently makes the difference between a profitable and a borderline operation.

Tests conducted in the McNally Pittsburg laboratory have shown operators that . . . in many cases . . . a profitable increase in coal recovery can be effected by installing facilities for re-treatment of material otherwise going to waste.

One company is transforming 120 tons daily from waste sludge into saleable coal. Many mines crush and re-wash middle-gravity material, recovering tons of valuable coal formerly discarded and lost in the refuse bank.

Today's coal market is an educated one. It demands specification fuel. It expects clean coal, prepared for its special needs as to grade and size . . . low and uniform in ash content; high in btu per ton. Only with modern automatic preparation can such coal be produced.

If you would like to examine the possibilities of modern preparation, our technical staff will be glad to call on you.

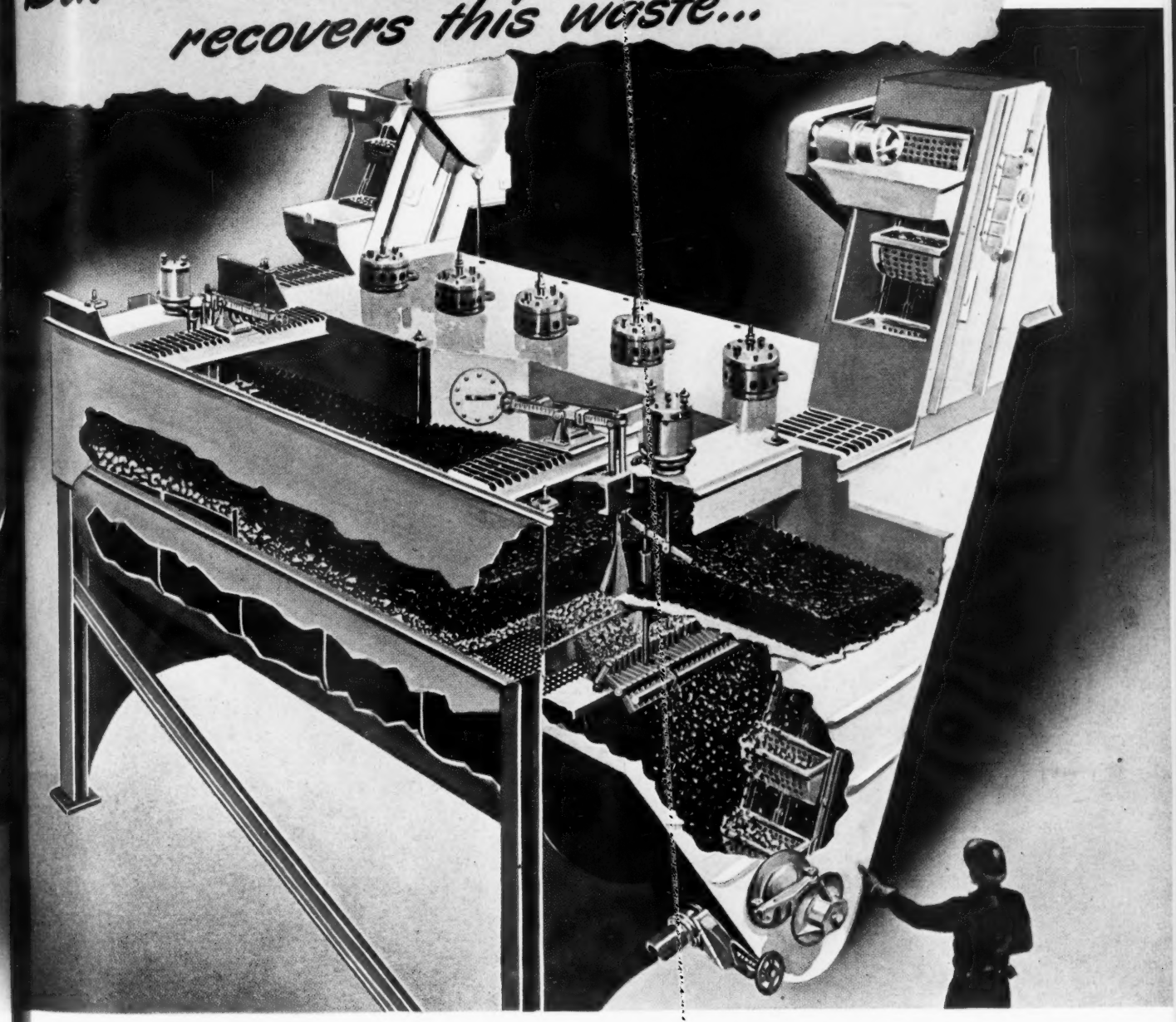
(Reproduction of advertisement substantially as it appears in Fortune Magazine)

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans. • Chicago 1, Ill. • Pittsburgh 22, Pa. • Caixa Postal 1310, Rio de Janeiro, Brazil

But the McNally-Norton Washer recovers this waste...



...AND TURNS IT INTO PREMIUM PRICE FUEL

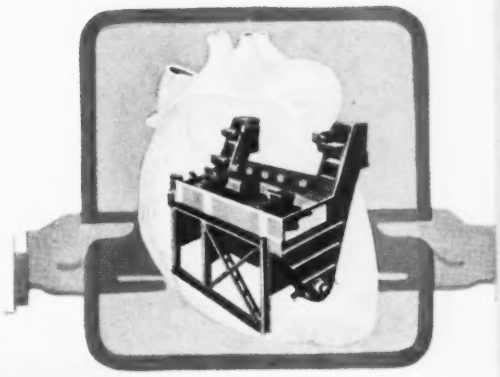
At the touch of a finger on the electric starting button, the McNally-Norton Washer separates coal from noncombustible material in the raw coal feed, obtaining the absolute maximum in coal recovery. It's the *heart* of a coal preparation plant.

The McNally-Norton is a compact impulse washer of the Baum type, with important improvements over the Baum jig principle. Hour after hour without attention, it controls the definite ash content regardless of variations in the raw coal feed.

Specific gravity of washed coal can be changed at will by sliding the control weight on a graduated balance beam.

An improved-design refuse gate which cannot jam makes it possible to wash coal in the McNally-Norton in a complete range of sizes up to seven inches.

Our engineers are at your service to recommend the proper McNally-Norton standard or compound washers to turn your coal into premium price fuel.



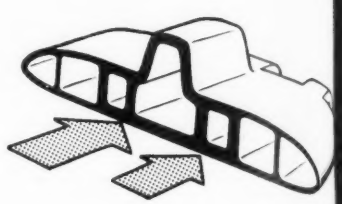
M NALLY PITTSBURG

MAN ACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans. • Chicago 1, Ill. • Pittsburgh 22, Pa. • Caixa Postal 1310, Rio de Janeiro, Brazil

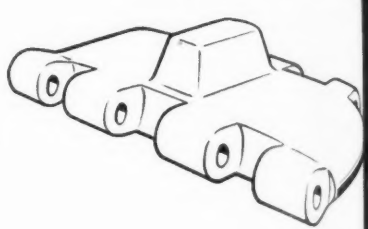
Ninety thousand pounds shovel weight plus 30,000 pounds digging load — and any one of the 66 hardened cast alloy shoes can take the whole 120,000 pounds. So strong, they'll outlast unhardened high carbon steel shoes at least three to one.

Double Thick WHERE THEY TAKE THE LOAD



Cross section shows double thick crawler roller paths, rigidly supported by double thick inside ribs. Cast, seamless, this shoe takes loads as a unit. Heat-treated alloy has basic strength, ductility to ride out shock loads, hardness to resist abrasion.

Self-Cleaning, OF COURSE! NO DIRT TRAPS



Like the shoes on Koehring equipment for 25 years, the hardened cast alloy shoes on the Koehring 605 have no dirt traps. Smoothly streamlined, they shed mud and stones and won't shower grit on the crawler belt rollers.

KOEHRING COMPANY • *Milwaukee 10, Wisconsin*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Markets, Mines, Machines and Men West Virginia Institute Themes

MEN OF American extraction are not rated highly by foremen in at least one district whereas these same foremen give high rank to men who reside away from the mining camp. These were two of several enlightening correlations brought out by a study of factors affecting miner performance reported in a joint paper presented at the annual meeting of the West Virginia Coal Mining Institute, Morgantown, Nov. 9, by S. R. Pursglove, personnel manager, Pursglove Coal Mining Co., and Quin F. Curtis, associate professor of psychology, West Virginia University. That the European market for coal may vanish in 1947 was the conclusion reached by Lt. Col. C. R. Mabley Jr., formerly chief, Solid Fuels Branch, Quartermaster Department, in a paper on the European coal situation. S. Dunlap Brady, mining engineer, Baltimore & Ohio R.R., described the seams, natural conditions and new mines in the new central West Virginia coal field, and Carol Robinson, of Robinson & Robinson, consulting engineers, Charleston, discussed the planning of the mining layout for mechanical operation.

Fred S. McConnell, president of the National Coal Association and president and general manager of the Enos Coal Mining Co., was guest speaker at the luncheon. James G. Stewart, Mayor of Cincinnati, entertained at the dinner, presided over by Arthur B. Koontz, Charleston. Joseph Pursglove Jr., president of the Pursglove Mining Co., was elected president. Laurence E. Tierney, president, Eastern Coal Corp. and retiring president of the institute, was on hand to steer the meeting. J. J. Foster, general manager, Island Creek Coal Co., was chairman of the morning session and R. H. Morris, vice president and general manager, Gauley Mountain Coal Co., was in the chair during the afternoon technical session.

Miner Traits and Rating

The correlation of foreman rating and miner characteristics reported on by S. R. Pursglove and Dr. Curtis was obtained from a study of 205 men who work only on loading-machine crews in two adjacent mines in northern West Virginia. The superintendents and general foremen rated the men as to desirability as if selecting them for permanent members of loading-machine crews. The selection was made by pairing men and picking the best one. That meant making 205 times 204 comparisons. The work of correlating the men's ratings with their personnel records taken from employment card data, was done by office help at the mine and by students at West Virginia University.

These correlations were shown in a form patterned after the mileage table of a road map. Men rated above average by foremen are indicated by plus signs and below average by minus signs. A high correlation is indicated by two like signs side by side and a moderate correlation by one sign. As an example, it was found, as might be expected, that a high percentage of the men rated above average are men who work the steadiest. Hence on the table, reading down from the column headed, "Men rated above average" and across from a line designated "Men who work the steadiest," the block at the intersection contains two plus signs.

As regards race, religion and a few other factors some unexpected correlations appear. Mr. Pursglove explained that all of these may not hold true in other localities. The point is that apparently the correlations can be used to some extent in predicting the rating of a prospective employee.

In a second part of the presentation Dr. Curtis dwelt on the possibilities of selecting men for loading-machine crews by tests on the order of those used so successfully to pick airplane pilots who would do the best job and are most likely to come back. To date the study has centered on checking what is required of men to be well suited to operating cutting and loading machines. Seeing at a distance was eliminated. Important factors are (1) ability to judge distance, (2) good coordination of mind and hands, (3) short reaction time; that is, making up the mind and acting after a stimulus through sight, hearing or touch.

Ability to judge distance is measured by the standard method of draw strings moving pins in a box. Coordination is being measured by having the man operate, from remote-control switches, a toy bridge crane fitted with a lifting magnet. The measure is the time required for him to pick up an iron washer from a pedestal and place it on another pedestal. This crane has a span of about 30 in., a runway about 5 ft. long and a lift of 2 ft.

To determine if such tests will be useful in selecting cutting- and loading-machine operators and in placing men in positions to which they are best suited, requires cooperation between laboratory and operating men. Dr. Curtis emphasized the coal industry's need for a continuous program of personnel research.

E. F. Limerick, personnel manager, Consolidation Coal Co., said that the table revealed several correlations he had not suspected. J. J. Foster, general manager, Island Creek Coal Co., mentioned that his company before the war had made some progress along the lines mentioned by Messrs. Pursglove and Curtis but because of the labor shortage put the program aside.

Coal in Europe

After outlining the normal productions, requirements and estimated deficiencies of the European countries Colonel Mabley summarized his conclusions as follows:

"The quantity of total shipments of coal from the United States to Europe will therefore depend upon three things: first, the continued availability of low-grade coal, for which purchases probably will be limited to something in the neighborhood of 1,000,000 tons per month; second, the availability of higher grade coals, for which there will be a European requirement of approximately 3,500,000 to 4,000,000 tons per month over the next five or six months; third, the success of the recipient countries in finding cash in United States dollars to pay for such quantities of coal.

"There are indications that vessel rates, which previously prevailed at approximately $18 per ton and which are currently quoted in the neighborhood of $9 per ton, will find a level of something in the neighborhood of $5 to $6 per ton. This decline will encourage shipments of coal from the United States within the afore-mentioned limits of continued availability of low-grade coal, increased availability of higher grade coals and the availability of United States dollars to the recipient countries with which to pay. The production of coal within the recipient countries whose production is now less than normal and in Germany and United Kingdom undoubtedly will increase in 1946 and 1947. Demand for coal in Europe will rise, but more slowly than production, as reconstruction proceeds. The European market for coal from the United States therefore will shrink proportionately to the point where it may vanish by the end of the 1946-7 coal year."

Discussions brought out the following: Of the several innovations discovered in European mining, two German methods are of interest to American mines. One is a large cutting, shearing and back cutting machine that operates on long faces and

WEST VIRGINIA OFFICERS

Officers for 1946 elected by the West Virginia Coal Mining Institute include:

President—Joseph Pursglove Jr., president, Pursglove Coal Mining Co.

Vice Presidents—J. J. Foster, general manager, Island Creek Coal Co.; R. H. Morris, vice president, Gauley Mountain Coal Co.; Jesse Redyard, formerly chief, West Virginia Department of Mines; George Higinbotham, assistant to vice president, Consolidation Coal Co., and William Beury, president and general manager, Algoma Coal & Coke Co.

Secretary-Treasurer—G. R. Spindler, chief, West Virginia Department of Mines.

Executive Board—C. W. Connor, manager, mining division, American Rolling Mill Co.; W. G. Crichton, vice president, Johnstown Coal & Coke Co.; T. E. Johnson, secretary-treasurer, Northern West Virginia Coal Operators' Association; John T. Sydnor, president, Rail & River Coal Co.; and Laurence E. Tierney Jr., president, Eastern Coal Corp.

loads to a conveyor. The other is the use of flexible steel belting. Principal reasons for Europe's low productions, on the order of 1 to 2 tons per man shift as compared to 5 or so in the United States, are thinness of veins, great depth, small shafts and 100 percent extraction coupled with the necessity for backfilling because so many mines are under industrial areas. In France about 10 percent of the mine labor was forced labor whereas in the Ruhr and Saar areas it was about 60 to 65 percent.

Mr. Brady described the seven seams making up an estimated 12-billion-ton reserve of coal, much of it in the Sewell seam, in Nicholas, Webster and Pocahontas counties of West Virginia comprising a field opened since 1940, when the B. & O. strengthened and rebuilt tracks that formerly served principally as lumber roads. The other seams are the Fire Creek, Toiga, Eagle, Peerless, Coalburg and Big Vein.

He also described briefly the 17 new mines opened or being opened. These are Elk Lick Coal Co., Kessler Coal Co., Bolair mine of Pardee & Curtin Lumber Co., Sewell Coal & Coke Co., Woolridge Coal Mining Co., Mount Hope Coal Co., Donegan Coal & Coke Co., Imperial Smokeless Coal Co., Drydock-Sewell Coal Co., Panther Coal Co., Johnstown Coal & Coke Co., Richwood-Sewell Coal Co., Tioga Coal Corp., Nicholas-Webster Coal Co., Raves Coals, Guyan-Eagle Coal & Coke Co. and a new mine of the Gauley Mountain Coal Co.

Labor Relations a Factor

Certain failures in mechanical mining, said Mr. Robinson, have been due not to selection of machines but to failure to take into account labor-management relations in the field. He advocated revising the supervisory force before installing the new machines. Rather than changing a whole mine over at one crack from hand to mechanical loading, he felt the better way is to install one mechanical unit, in a separate and distant section of the mine, if possible, and without causing the remaining hand loaders to suffer car shortage, then train that crew until a good efficiency is reached and follow by expansion with a second unit, and so on.

In opening a new mine or section for mechanical work the mining layout can be selected only after the type of equipment has been selected. After all available information regarding the seam has been assembled and studied, the final selection of equipment usually can be narrowed to two or three competitive ways of loading and handling. On further study of seam conditions and labor-management relations depends the final selection.

Proved efficiency of belt haulage and portal-to-portal pay are new influences. There is a trend to keep the mine opening and tipple closer to the production center. Where that is not practicable; for instance, in much of West Virginia, the lamp house and wash house are moved to a point closer to the producing territory.

Discussing the subject, George Higinbotham, assistant to the vice president, Consolidation Coal Co., said he has seen three complete failures in trying to mechanize piecemeal, one by loading machines and two by conveyors. The two mines to be mechanized next will be changed at one stroke. Mr. Foster agreed with Mr. Robinson that it is preferable to train new men for mechanical work rather than get men from another mine where they have been trained under a different condition or set-up.

"Don't take too much satisfaction from the situation we are in today," warned Mr. McConnell at the luncheon. He discussed the programs of Bituminous Coal Institute, National Coal Association and Bituminous Coal Research and especially emphasized the necessity for making the public sympathetic to the industry. "We must realize," he continued, "that the coal industry is going into a difficult condition and must spend money. Other industries have spent more—we are laggards. Only as we serve are we going to prosper—we have a responsibility to labor and the public."

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Dr. Potter Resigns; SFAW to Liquidate

Dr. Charles J. Potter has resigned as Deputy Solid Fuels Administrator effective Nov. 21. He joined the government's wartime solid fuels agency in 1941 as consultant to the Solid Fuels Coordinator, predecessor to the Solid Fuels Administration. Later he was named chief of distribution under the former agency, and became Assistant Deputy of the Solid Fuels Administration upon its organization in 1943. Upon the retirement that year of Deputy Administrator Howard A. Gray from government service, Dr. Potter was appointed Deputy Administrator. He previously had served as assistant chief of the Marketing Branch of the former Bituminous Coal Division and was personally responsible for much of the huge job of establishing minimum prices and marketing rules and regulations promulgated by that agency under the Bituminous Coal Act of 1937. He has returned to the post of assistant to the president of the Rochester & Pittsburgh Coal Co., Indiana, Pa.

Dr. Charles J. Potter

Dan H. Wheeler, formerly Assistant Deputy Administrator, who has been appointed Deputy Administrator, has long been in the government service. He first became identified with the administration of government coal activities in 1939, when he was appointed as Assistant Director of the Butuminous Coal Division. He became Director of the division in 1941 and held that position until his appointment as Assistant Deputy Solid Fuels Administrator in 1943.

In announcing Dr. Potter's resignation, Secretary of the Interior Harold L. Ickes paid him this tribute: "Dr. Potter has served his nation with distinction in a most difficult and responsible wartime task. To him is due a great share of the credit for our success in providing industry with the tremendous quantity of fuel that it needed to help win this war with a minimum impairment of the fuel supply for heating our homes and for the civilian economy. Now that our enemies have been defeated, and the end of our wartime fuel problems is in sight, he has exercised his prerogative to return to his peacetime job in the coal industry."

At a meeting of the Solid Fuels Advisory War Council on Nov. 14, Mr. Wheeler announced that, effective April 1, 1946, SFAW plans to close 22 field offices and release all personnel connected therewith, predicated on the cessation of all SFAW regulations by that time. Further plans are under way to reduce the Washington office personnel on or before that time, with complete liquidation of the agency planned by the end of June, 1946. Steps have been taken to liquidate the Conservations and Information divisions by Dec. 13, 1945. SFAW hopes that its Statistical Department will be transferred to the Bureau of Mines on a permanent basis.

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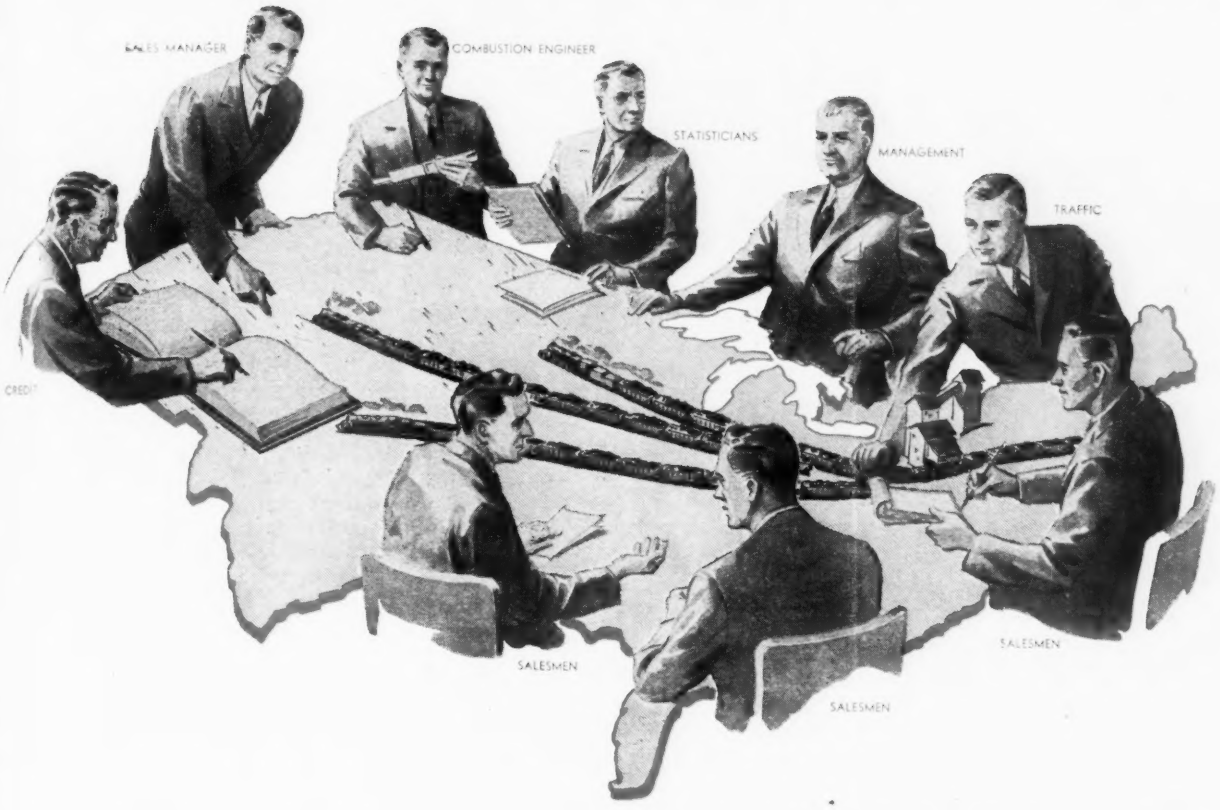
Distillate Oil Demand Causes Concern

Demand for diesel and home-heating oils is rising so rapidly that equipment must be redesigned to use large quantities of cracked distillate oils, oil marketing leaders told diesel and oil-burner manufacturers Nov. 15. Unless this is done, the supply of uncracked fuel will be inadequate to keep pace with demand and fuel prices for diesel engines or oil burners will rise to prohibitive levels, it was agreed in a discussion of "Fuel Oil Availability" by the American Petroleum Institute's marketing division.

The oil industry is seriously concerned over the rapidly rising threefold demand for the limited supplies of uncracked distillate, declared S. B. Eckert, vice president, Sun Oil Co. Demand for this fraction of crude, known as the "middle distillate" cut, comes from three expanding types of uses: high-speed diesel engines, the home heating market, and charging stock for catalytic cracking refineries, he said. This means that the entire demand must be satisfied from 25 to 30 percent of the crude oil charged to refiners. Unless



What is a COAL SALES COMPANY?

A COAL SALES COMPANY is a responsible, experienced and well-financed organization, composed of men qualified by training and knowledge to do a modern merchandising job.

The personnel of such an organization know the kinds and sizes of coal suitable for specific plants and types of equipment in the markets they serve, the relative market values of those coals, how to get the best price, the credit standing of the buyer, the regulations that must be satisfied in the sale, and all the other specialized information required to move coal in a buyer's market.

Since a coal selling organization serves many producers simultaneously, it can and does perform a complete service at a cost per ton to each producer well below the cost of maintaining a similar organization himself.

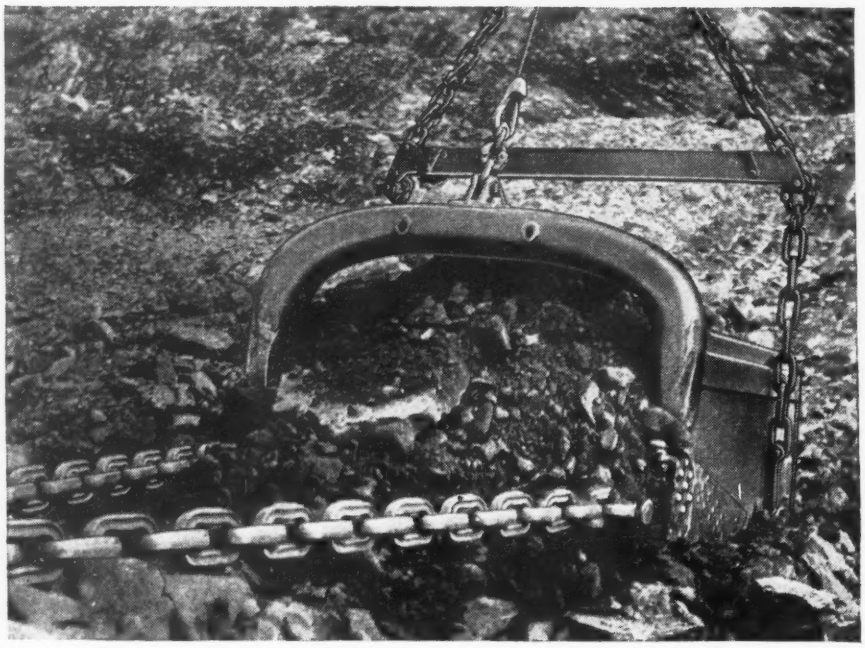
The specialized merchandising knowledge of a coal selling company is comparable to the specialized production knowledge of a coal mining company—to succeed each must have the other. Together they can keep coal's place in the highly competitive fuel markets of tomorrow.

AMERICAN COAL Sales ASSOCIATION . . . Washington, D.C.

bigger output

WITH

OVERSIZE ESCO DRAGLINE BUCKET



THE MAUGER Construction Company, Zanesville, Ohio, strip overburden from coal deposits with this 15-yard ESCO Stripping Dragline Bucket.

Operated on a 9W Monighan with 160 ft. boom, this 15-yard bucket is oversize for this machine. The greater bucket size is possible because ESCO Manganese Steel Dragline Buckets are the lightest, strongest buckets ever made. Their lighter weight makes greater payloads possible —increases output.

The overburden on this operation is 40 to 80 feet deep and consists mostly of sand rock, which is shot by both horizontal and vertical drilling. The large pieces are handled effectively by the extra wide front of the ESCO Bucket—and better digging is achieved by the exclusive ESCO tooth and front design.

We'd like to give you the full story about these lighter, stronger ESCO Dragline Buckets. Write or wire us today.

ELECTRIC STEEL FOUNDRY

2141 N. W. 25th AVENUE • PORTLAND 10, OREGON

OFFICES AND WAREHOUSES

SEATTLE, 4 2724 First Ave. S. Elliott 4161	HONOLULU, 5 814 Kapiolani Blvd. Phone 6486	NEW YORK, 17 Graybar Building Lexington 28958	SAN FRANCISCO, 7 699 Second Street Douglas 8346
SPOKANE, 8 721 S. Monroe St. Main 5530	LOS ANGELES, 11 2700 Santa Fe Ave. Lucas 7251	CHICAGO, 1 221 N. LaSalle St. Dearborn 2284	CHARLESTON 1, W.VA. Kanawha Valley Bldg. Phone 33-615

equipment is redesigned to use large quantities of the equally efficient cracked distillate fuels, he continued, the excessive demand for uncracked gas oil will result in raising the price of this product to a point where either the cracking still, the diesel engine or the oil burner will no longer find it profitable to use it.

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Manpower Dominates British Coal Industry

Manpower is the key to Britain's present coal shortage and the problem is that a shadow hangs over the future of the British coal industry, according to reports from the McGraw-Hill London News Bureau. So critical has the problem become that the government has taken the leaders of the National Union of Mineworkers into its confidence regarding nationalization plans. In turn the N.U.M. leadership has completely reversed its traditional slow-down tactics and is making every effort to get coal out of the pits.

The present working force in the coal mines is 700,000 (it was 782,000 in 1938) and, of this total, 100,000 are over 55 and 40,000 are "Bevin boys," most of whom have not taken the trouble to learn the trade. On an average 6,000 miners are out of the pits every day because of illness and injuries and for other reasons. In reality, the working force is about 630,000, and even this figure fails to give an adequate picture since many of the men are tired and underfed, while the youngest and strongest are often the least willing to work hard. In addition there is widespread absenteeism much of which the N.U.M. itself regards as unjustified.

This is explained in part by the fact that income tax takes such a large share of high wartime earnings that the average miner is unwilling to spend more time underground than is necessary to keep his family alive. The return of servicemen to the mines will not provide a solution for this situation. Out of, roughly, 100,000 miners who went into the forces, a large proportion were in the North African and Italian campaigns and it is estimated that hardly more than 30,000 are now alive and able-bodied. N.U.M. leaders do not expect more than 5,000 servicemen to go back to their former trade.

The Bevin boys will leave the pits as soon as they can and new recruits will be few, as most miners refuse to let their sons follow in their footsteps.

Chief reliance of Will Lawther, N.U.M. president, and Arthur Horner, National Production Officer, is on fostering a new spirit in the mining districts and getting the most out of the men by way of steadier work and more active interest. Much has been achieved already by the promise of public ownership; indeed, it is generally conceded that the basic reason for immediate nationalization was to boost the miners' morale. But, in addition, the N.U.M. is distributing hundreds of thousands of poster bills in the mining districts telling the men that the fate of the Labor Government depends on them.

In fact, the N.U.M. has completely reversed its traditional methods. Whereas

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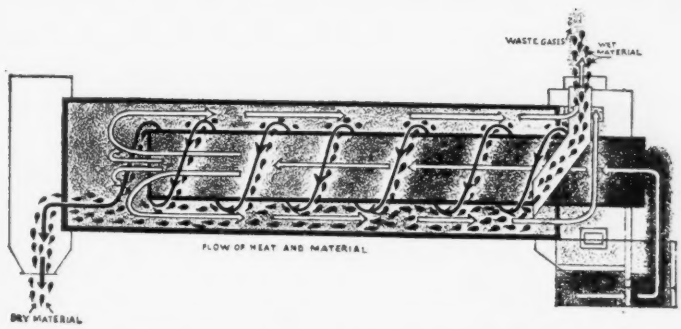

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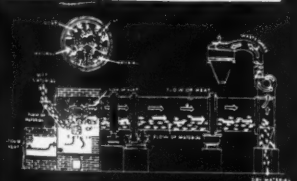
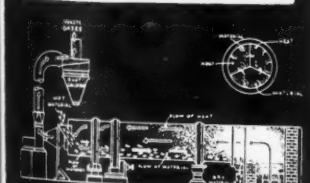
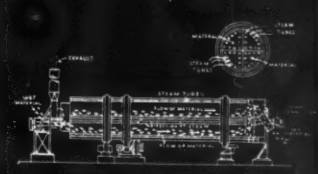


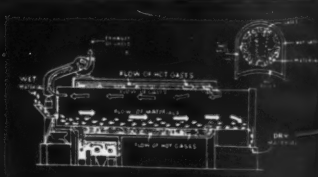
Direct Heat Parallel Flow Prinicple



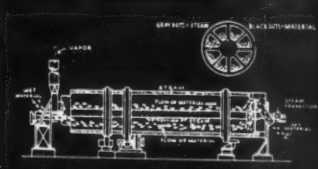
Direct Counter Flow Principle



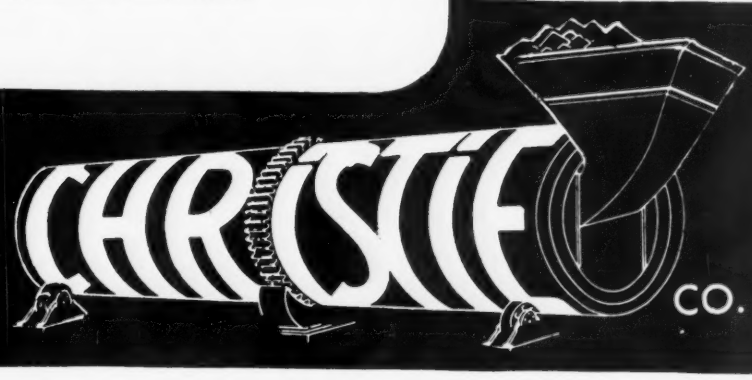
Steam Tube Principle



Enclosed Direct Heat Principle



Steam Jacketed Principle



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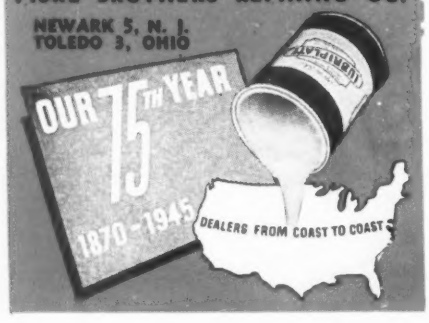

union leaders always supported the workers in slow-down tactics and the miners regarded those men who could outwit the boss as heroes, an effort is being made today to pillory the slacker. Moreover, the union has threatened to drop members who persist in absenteeism.

The N.U.M. used to fight medical examinations, asserting that they were merely a device for laying men off. Now, in the hope of alleviating the ravages of silicosis and pneumoconiosis, it is insisting on medical facilities and enforcing their utilization on both mine owners and mine workers.

In the case of labor-saving machinery, too, the N.U.M. has changed its position, for the union leaders fully accept the technical recommendations of the Reid report. But they are faced with two problems in getting the support of rank and file workers: (1) Despite removal of the unemployment threat, there is a hangover of the opposition to new machines that was so long prevalent in the mines; and (2) there is a feeling on the part of the miners that they should be paid for all the extra coal they are enabled to produce as a result of the new machinery. The second problem arises from the fact that many of the men think of themselves as selling coal, not labor.

N.U.M. is supplementing its general appeal for more sustained work by the use of reconstituted pit committees composed of representatives of management and mine workers. In Horner's words, "Whilst a pit is working the manager of the mine will be as responsible and authoritative as the captain of a ship at sea. However, before or after the termination of a shift, managers in the future must be willing to examine and give serious consideration to what the men's representatives have to say."

To insure that workers' representatives on pit production committees are listened to, production officers employed by the N.U.M. have been appointed in every district. These men are to work in close conjunction with the regional officers of the Ministry of Fuel and Power to see that every feasible idea for increasing production is examined.

However successful these new methods may be in getting the most out of the present working force, they will have relatively little effect on the long-run manpower problem of the coal industry. According to Horner, at the present high rate of wastage—40,000 a year for the whole industry—and the slow rate of recruitment, the South Wales mines will be bereft of manpower in a generation.

N.U.M. believes that there are two ways this situation can be met: (1) by complete reorganization of the industry along the lines of the Reid report, making mining a high-wage, highly skilled occupation that will attract and hold workers; (2) by importing foreign labor, as the United States has done in the past.

Since coal is absolutely essential to Britain, this second alternative undoubtedly would be tried as a last resort, but N.U.M. leaders feel that it will be unnecessary if a modernization scheme under national ownership can produce sufficient benefits for the miners.

Their long-run program for the men includes the following items:

1. Five-day week with six days' pay.
2. Three weeks' vacation pay.
3. Subsidiary pensions for miners at 55 years of age.
4. Adequate training schemes and proper conditions for entrants into the mines.
5. Better safety conditions and improved medical service.
6. High social amenities including housing, pithead baths, etc.

This is an ambitious labor program for an industry that has doubled wages during the past six years, despite a 10 percent drop in productivity and on which huge sums will have to be spent for modernization. But the mine workers have finally achieved their desire for nationalization and they may get these benefits to boot. If so, will the result be a further increase in coal costs (now more than double 1938) or will it be an efficient coal industry?

•

Mining Group Hears Electrical Talk

After the usual evening dinner, the November meeting of the Mining Electrical Group of Southern Illinois was called to order by R. E. Sontag, newly elected president. Other officers for 1945-46 are Fred Giese, vice president; E. W. Stewart, secretary, and Roy Metcalf, treasurer. A report from the treasurer disclosed healthy conditions financially and in membership.

The president introduced A. E. McKenzie, St. Louis representative of I-T-E Circuit Breaker Co., sponsor of this program, who presented Donald Baker, assistant sales manager, speaker of the evening. Mr. Baker read a paper entitled "Forthcoming D.C. Underground Circuit Breaker Applications," which discussed some of the proposed standards of application that are in the making.

High-resistance grounds in coal mines are bad actors. They have caused many bad fires and cost many lives. The basic problem is, how to eliminate this danger from fallen trolley wires and other high-resistance grounds.

Although the elimination of continuing accidental grounds from fallen trolley wires has been one of the objectives, the economic profit of more coal has been the primary aim of sectionalizing d.c. mine circuits with circuit breakers. Whether few or many circuit breakers were used, a mine so equipped was considered sectionalized. The fact that fires still happen is proof of an inadequate job.

Considerations of safety and property loss demand that something be done to eliminate this hazard; to prevent a fire from even starting. A study of mine conditions and haphazard installation of sectionalizing circuit breakers points to two things that must be done: Standardize on a scientific layout for circuit breakers; sensitize circuit breakers feeding a grounded line so that they trip off the line although not carrying sufficient current to trip.

Covering the first point, tentative recommendations are: (1) install a circuit breaker in each feeder from a substation; (2) install a circuit breaker between each two

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this exclusive new Mine Conveyor is designed to get maximum production out of low coal veins with the greatest efficiency and economy. Faces that may have to be abandoned when worked by other methods can be operated profitably with the Robins Mine Conveyor.

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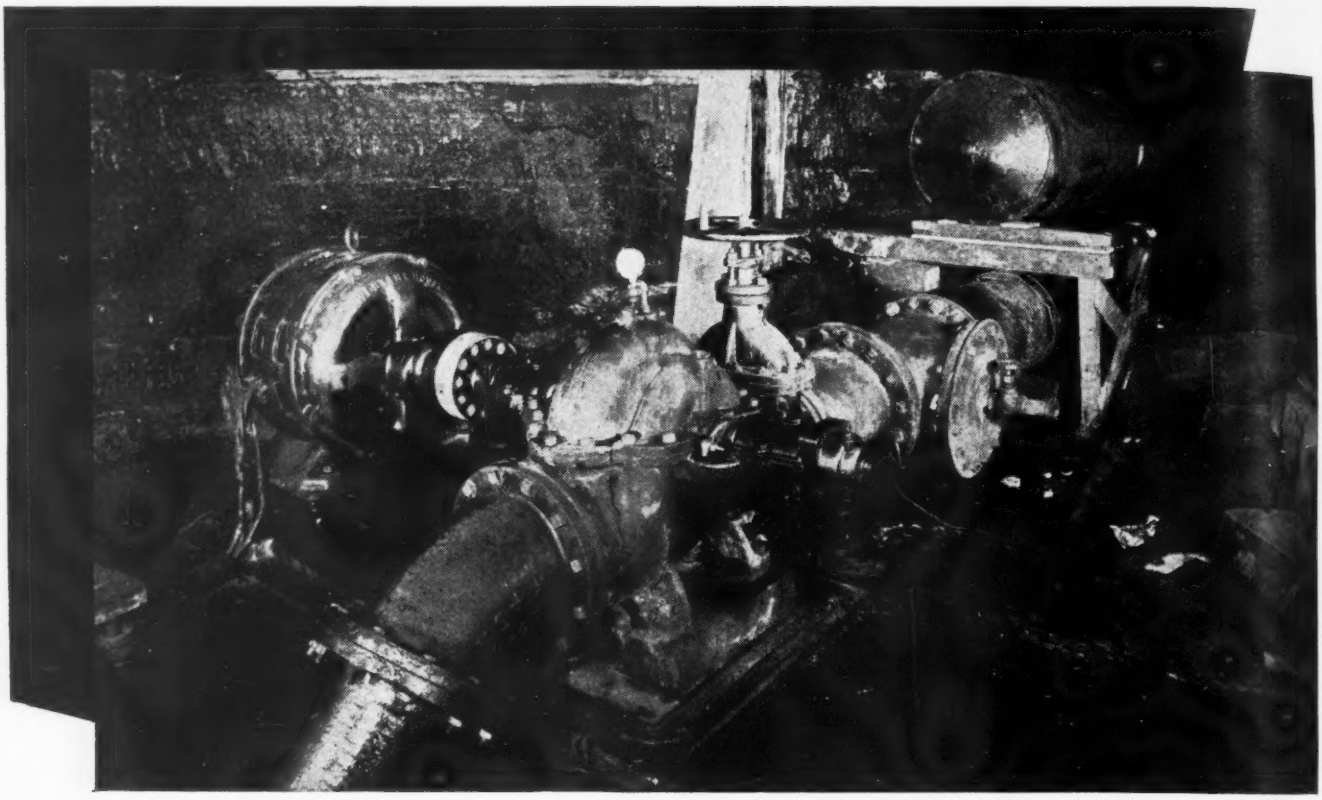

This Warren Pump in Coal Mine Cuts Pumping Costs Each Month

Wooden hand pump used to drain Gallitzin area mine, one hundred years ago.

A bituminous mine in the Gallitzin area of central Pennsylvania found its old power pumps inadequate to handle drainage. Warren engineers were called in. They recommended the all-bronze, chrome-fitted centrifugal pump shown above.

Capacity; 3500 gallons per minute; 12" suction, 10" discharge openings. In dry seasons, need be operated for only 7 to 10 hours a week. It saves mine owners many dollars in pumping costs each month.

For complete specifications and ratings on this and other Warren Pumps, send for Bulletin 227-1.

ARMY E NAVY

WARREN STEAM PUMP COMPANY, INC.

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substations; (3) install a circuit breaker in each main branch stub feeder.

The second point, sensitizing circuit breakers to high resistance grounds, has been tackled by three methods. The Pittsburgh Coal Co. imposes high-frequency currents on d.c. trolleys to locate high-resistance shorts. Westinghouse uses special trolley hangers to support a No. 8 bare copper pilot wire. Energizing this wire, positively or negatively, opens the circuit breaker. I-T-E uses a No. 22 insulated conductor supported on insulators at 10-ft. intervals. This wire is energized at the end of the trolley in any particular entry, and it controls a relay that operates the circuit breaker. Any roof fall that will bring down the trolley wire will break this control wire and open the breaker, even before a short circuit can be established.

The president announced that Dec. 6 would be ladies' night. The meeting scheduled for Jan. 3 will be given over to exhibits by manufacturers and sales agents. This privilege is to members of the society only.

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Announces Change In Pea Specifications

Standard anthracite specifications on pea coal were changed as of Nov. 1 to permit the use of 12 percent ash on a dry basis as an alternate for the previous slate and bone tests, according to an announcement by the Anthracite Committee. Previous to Nov. 1, standard specifications had allowed maximum impurities in terms of 4 percent slate and 5 percent bone. The new standard retains this definition but allows the optional specification of less than 12 percent ash.

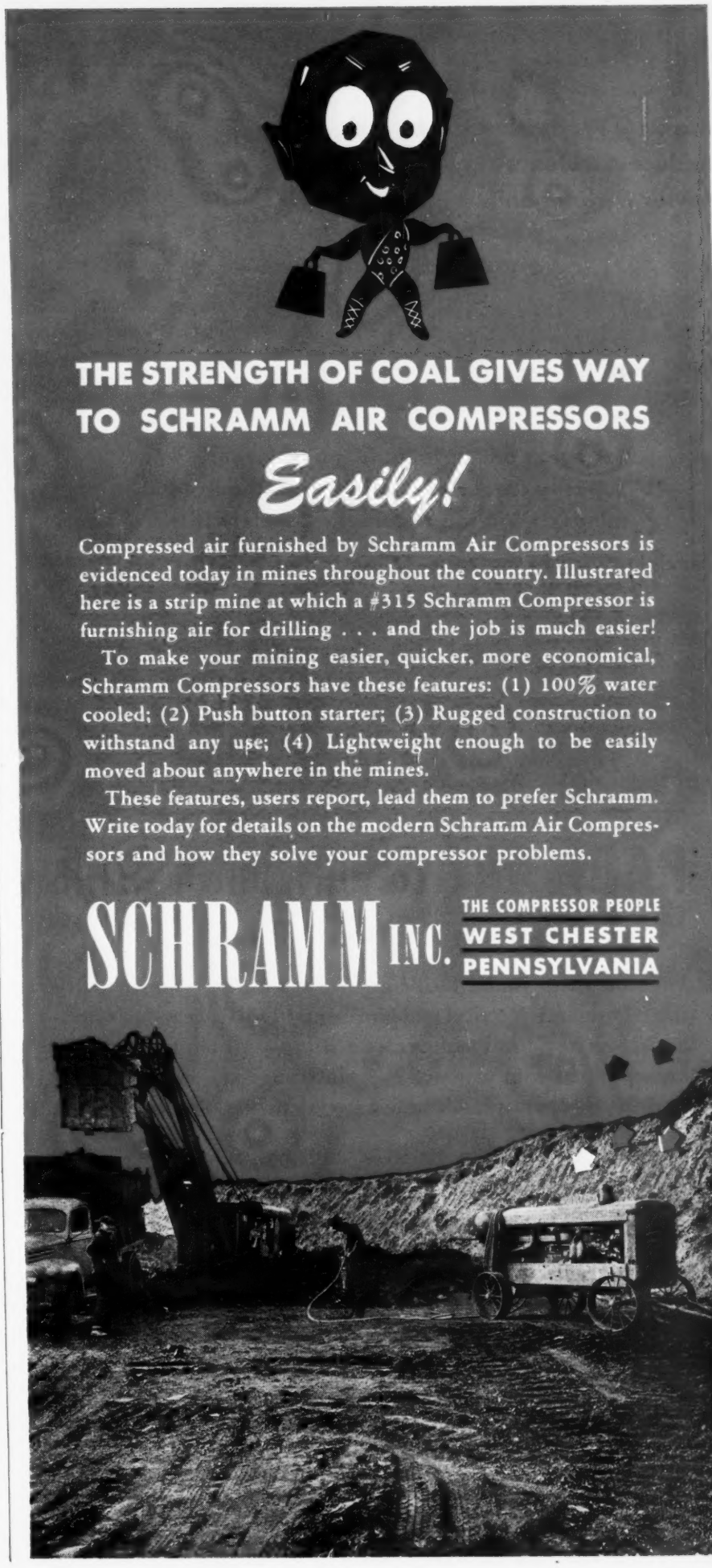
•

State Files Replies To Operators' Suits

Answers to three separate suits against the Commonwealth, challenging constitutionality of the 1945 act regulating strip mining in Pennsylvania's bituminous coal fields were filed Oct. 30 in the Dauphin County Court at Harrisburg. The Departments of Mines and Forest and Waters offered in rebuttal denials of allegations made by three Clearfield County operators who sought injunctions restraining the State from enforcing certain restrictions of the law. Plaintiffs were Alexander Dufour, Bloom Township; Elba Coal Co., Madera, and Yorkshire Coal Co., Madera.

Mines Secretary Maize and Secretary of Forest and Waters James A. Kell denied the act was unconstitutional. Specifically the State denied operators' contentions that:

1. The act has no application to mining that began prior to its passage last May 31.
2. The filing of a $100 registration fee with the Department of Mines is a "tax."
3. Covering the face of unmined coal is not necessary, alleging that spontaneous combustion might otherwise result.
4. Leveling and rounding off of peaks and ridges of spoil banks are not necessary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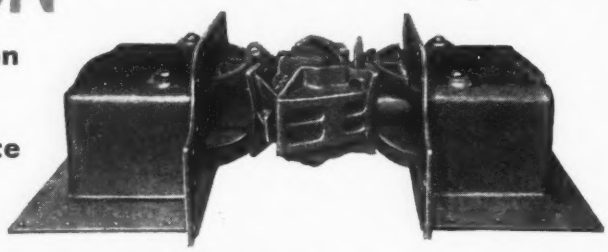

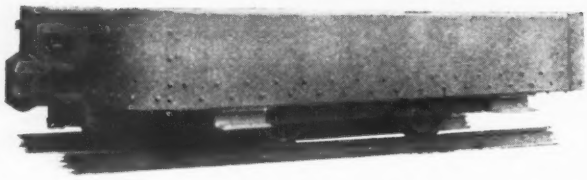

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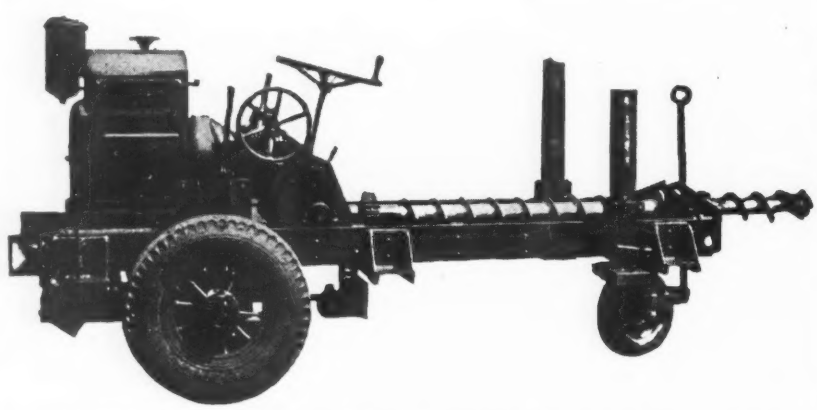


PARIS MANUFACTURING CO.
PARIS, ILLINOIS

to prevent erosion of the soil, contending streams would be polluted and erosion of possibly productive lands would result.

5. Planting of trees, shrubs or grass on lands affected by open-pit mining serve no purpose commensurate in value with the cost, claiming the law is not "arbitrary or unreasonable" in that respect.

•

Briquet Plants Ready to Start

Two briquet plants that have been under construction for the Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., were scheduled to begin operation about Dec. 1. Test runs have been made in the Locust Summit plant and similar tests were to be made at the St. Nicholas plant. The plants were constructed by Day & Zimmerman, Inc.

•

Smoke Control Group To Survey Toledo

As its first major project since its reorganization the Coal Producers' Committee for Smoke Abatement has completed arrangements with officials of Toledo, Ohio, to conduct an exhaustive survey of power and industrial plants as well as schools, churches, apartment buildings, public buildings, laundries and dry cleaning establishments. Toledo's City Manager, George N. Schoonmaker, requested R. E. Howe, chairman of the committee, to make the survey after an ordinance restricting the "kind of coal" that might be burned in hand-fired operations was introduced in the City Council.

Engineers who assisted in the survey are: George W. Land, West Kentucky Coal Co., Inc., Earlington, Ky.; Fred Brower, Hatfield-Campbell Creek Coal Co., Cincinnati; Minott Brooke, Chesapeake & Ohio Ry., Huntington, W. Va.; E. D. Benton, W. L. Pedigo and J. E. Rogers, Louisville & Nashville Ry., Louisville; H. N. Holloway, Island Creek Coal Sales Co., Detroit; T. P. Bateman and L. Gray, Consolidation Coal Co., Detroit; Lloyd C. Williams, Lorain Coal & Dock Co., Cleveland; A. L. Muldoon, C. & O. Ry., Detroit; Harry P. Barnes, Hanna Coal & Ore Co., Detroit; Frank Stilwell, North American Coal Corp., Cleveland.

•

W.V.U. Soon to Have Liquid Fuel Test Plant

A new laboratory and research unit where the U. S. Bureau of Mines will conduct experiments in producing gases required in the manufacture of synthetic liquid fuel from coal will be established soon on the campus of West Virginia University, Morgantown, W. Va., according to an announcement Nov. 2 by Secretary of the Interior Harold L. Ickes. Under a cooperative agreement between the Bureau of Mines and the university, the Bureau will initiate a research program involving about $100,000 annually. Labora-

tories will be provided by the university and will be staffed with Bureau personnel, Secretary Ickes stated. Extensive preliminary research will be carried out.

The project is another important part in the large-scale development of the five-year synthetic liquid fuels program authorized by the 78th Congress under identical bills introduced in the Senate by Senator Joseph C. O'Mahoney of Wyoming and in the House by Representative Jennings Randolph of West Virginia. Two processes are in general use for converting coal or lignite to liquid fuels, and as both involve the use of gases the new West Virginia University laboratory is expected to hold a key position in the future development of the Bureau's synthetic liquid fuels research.

Establishment of the laboratory at West Virginia University will be under the direction of W. W. Odell, chief of the Bureau's Synthesis Gas Production Division, who has had wide experience in gas-making processes not only in federal service but also with several large industrial corporations. From 18 to 20 Bureau technologists versed in the specialized phases of the production of synthetic liquid fuels from coal will be employed in the West Virginia University laboratory. This staff, however, may be augmented by members of the West Virginia University faculty or graduate fellows selected by the University to work under the technical direction of the Bureau's representative in charge.

Selection of the Morgantown site for the Bureau's gas-syntheses laboratory is especially advantageous, Secretary Ickes said, because the university is situated strategically in the West Virginia-Pennsylvania-Ohio-Kentucky bituminous-coal-producing area.

•

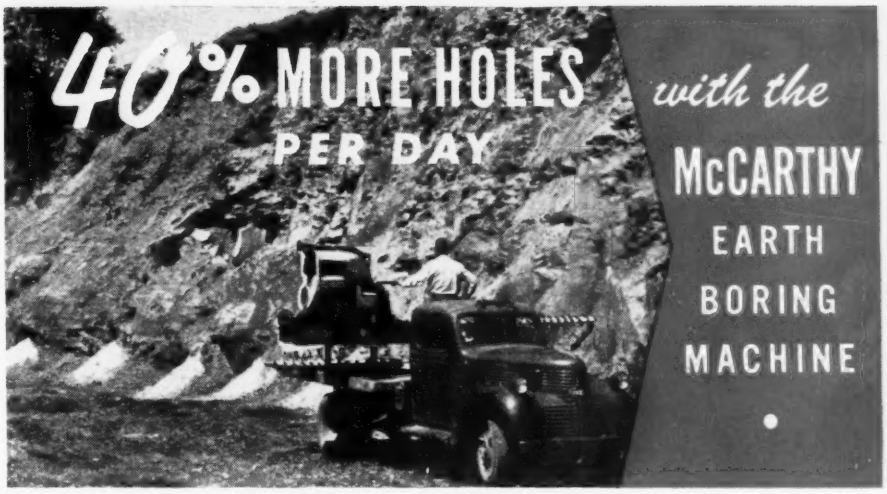
Lausche Declines To Inspect Strippings

Reiterating his intention of supporting legislation for control of strip mining in the State, Gov. Frank Lausche declined the invitation of the Ohio Reclamation Association to inspect the eight-year efforts of the organization to reclaim Ohio's strip-mine area. The chief executive told Allan R. Davidson, president of the reclamation group, that voluntary rehabilitation of thousands of acres of spoil banks in the eastern part of the State "is not enough for the taxpayers."

Mr. Davidson asked the Governor to visit eastern Ohio "to look beyond the raw banks and see our efforts to reclaim this land." He pointed out that 3,500,000 trees had been planted and 2,500,000 more will be planted next spring.

"Your association obviously is opposed to enactment of a law regulating strip mining," Governor Lausche replied. "The work you are doing is of value and contributive of some good, but it is not enough for the taxpayers and the people of Ohio to depend upon the whims of fleeting resolutions, here today and gone tomorrow, voluntarily to do the job of rehabilitation."

The State Strip-Mine Investigating Com-



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Deltabeston Asbestos-insulated Magnet Wires are designed to protect motors against high ambient temperatures and overload heat. Despite very severe operating conditions, Deltabeston's impregnated asbestos insulation just won't bake out. Deltabeston not only successfully withstands high heat and other deteriorating conditions but can be formed into the most intricate shapes without rupturing the insulation. It is available in round, square and rectangular shapes in a complete range of sizes. If you prefer ready-made coils with class B insulation, specify Deltabeston.

You can obtain additional information by writing to Section Y1251-10, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn. All Deltabeston Wires and Cables are distributed nationally by Graybar Electric Co., General Electric Supply Corp. and other G-E Merchandise Distributors.

BUY VICTORY BONDS AND KEEP THEM

GENERAL ELECTRIC

mission has decided to use its powers of subpoena if necessary to get at the cost of strip-mined coal as compared with deep-mined coal. The decision to compel the coal producers to produce their records was reached at a meeting Nov. 2 in Columbus. The commission chose Robert H. Hoffman as research director and to make inspection trips to strip-mined areas. Mr. Hoffman formerly served in the Franklin County auditor's office, had two terms in the State Senate and has been a member of the State Board of Tax Appeals.

The commission also decided to make at least three trips to Ohio strip-mined areas and possibly to other States. State Senator E. E. Addison, chairman of the commission, explained that the time was short, as Governor Lausche had requested a report before he calls the Legislature into special session early next year.

The group inspected operations in Muskingum, Guernsey, Harrison, Jefferson and Belmont counties Nov. 8 and 9, going on to inspect those in Mahoning, Stark and Columbiana counties Nov. 15 and 16, besides going to Florence, Pa., to look over stripped land that has been restored by operators.

Representative J. A. Gordon, Cadiz, a member of the commission, outlined a tentative program for the commission in which he furnished figures showing that limestone and not coal was the mineral most heavily strip-mined in Ohio last year. There were 13,272,408 tons of limestone stripped compared with 10,051,920 tons of coal.

•

Mines Bureau Men Study Anthracite

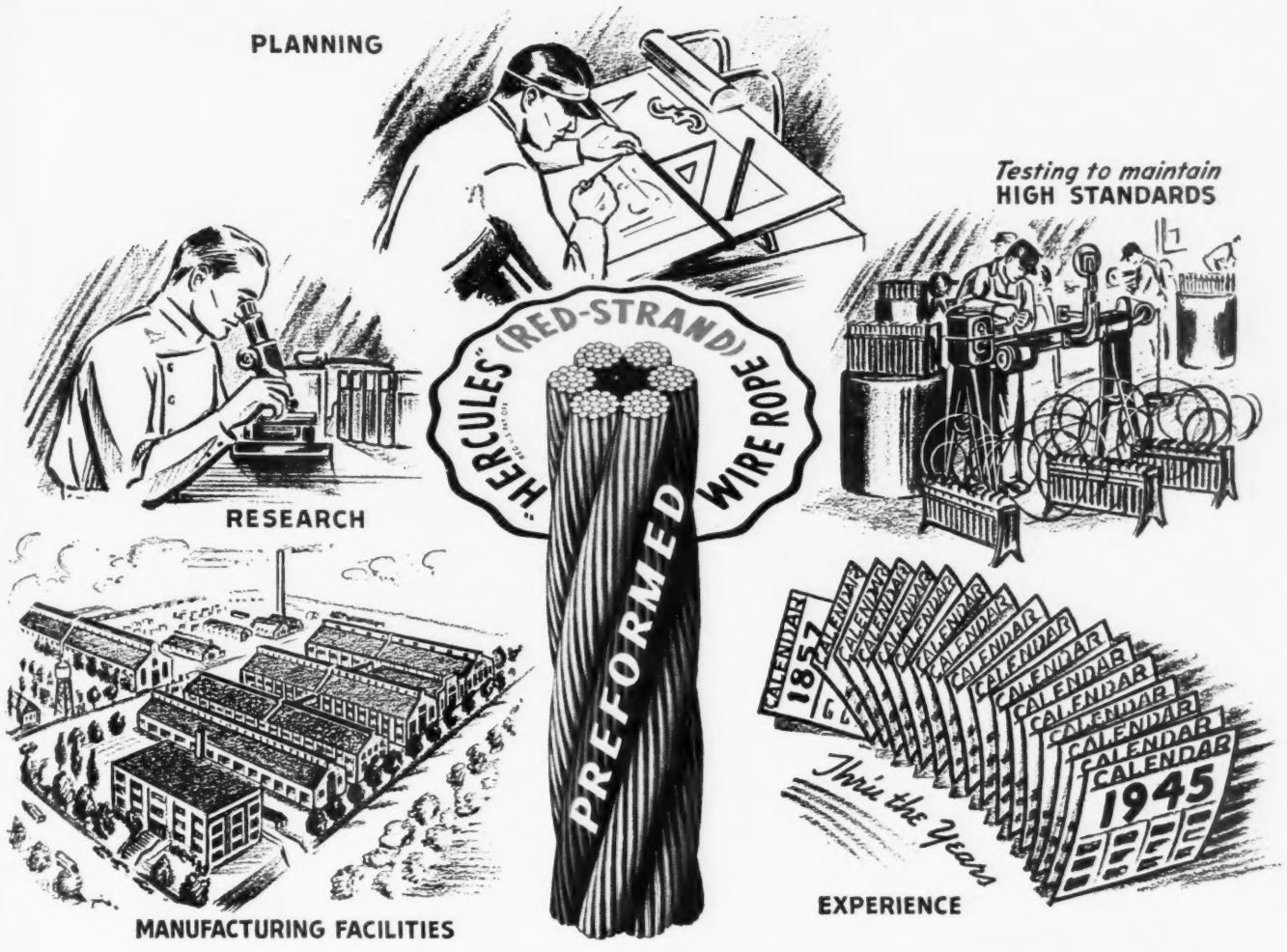
Members of the U. S. Bureau of Mines' anthracite advisory committee assembled in Washington Nov. 27 to learn of current American research in hard-coal-mining problems. The committee, which includes two Pennsylvania cabinet officers, three United Mine Workers district union presidents and a dozen Pennsylvania anthracite executives, was summoned to a closed meeting.

Bureau of Mines spokesmen said the agenda included discussion of wartime technological developments discovered by bureau engineers on a tour of German coal mines and also reports on prevention of mine flooding and on mechanical backfilling techniques to prevent subsidence. John Buch, bureau engineer, who visited German mines after V-E Day, was to describe operations of the Nazis' "coal-plane" machine, which is said to scrape coal from the seams at a top rate of about 100 tons an hour.

•

Obtains Strip Lease On N. Carolina Tract

Hamilton Wood, Hendersonville, N. C., geological and mining engineer, is reported to have obtained a lease from the North Carolina State Highway Department on a portion of a 1,000-acre tract in Moore County, where he proposes to strip-mine the coal-bearing part of the tract and pay



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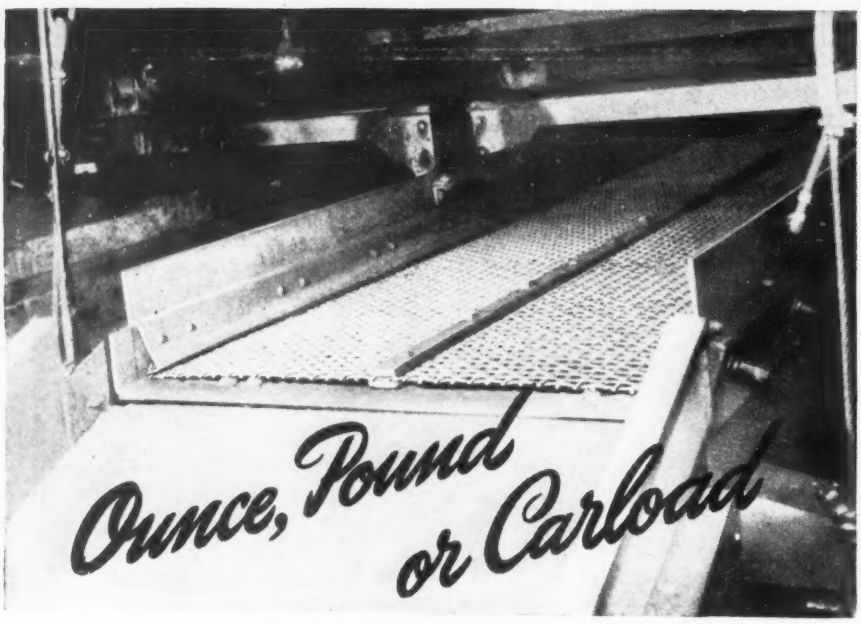

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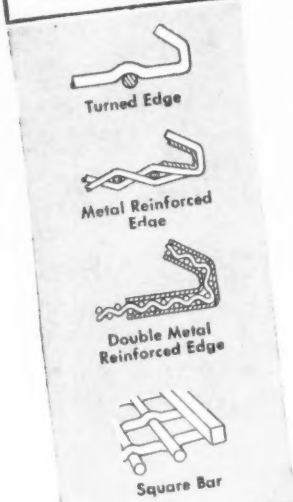

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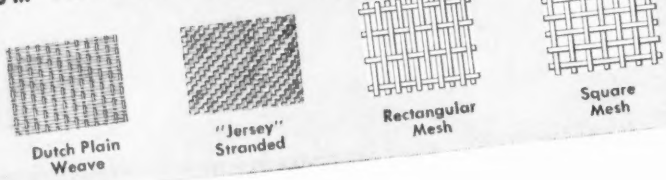

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the highway department a royalty of 10c. a ton. The lease is for ten years, the department being guaranteed a minimum of $2,000 annually.

The highway department purchased the tract with the idea of providing its own coal, but long ago abandoned the project. Wood, however, says the plan is economically feasible, with the coal on the tract salable for steam purposes.

•

Pittsburgh-Consol Merger Takes Effect

Pittsburgh Consolidation Coal Co., the nation's largest commercial producer of bituminous coal, was organized formally Nov. 26 at a meeting in Pittsburgh of its 15-man board of directors. The board, headed by Robert C. Hill, New York, chairman, and George H. Love, Pittsburgh, president, named A. K. Oliver as chairman of the finance committee; James B. Morrow, Pittsburgh, first vice president; George W. Kratz, vice president, and C. E. Beachley, secretary and treasurer.

"The bituminous coal industry has suffered from declining markets due to the invasion of competitive fuels for a number of years," said Mr. Love. "The spirit and aim behind this merger is to have strong, well-financed, aggressive units which will fight to restore coal as an undisputed primary source of energy."

Pittsburgh Consolidation, a combination of the Pittsburgh Coal Co. and the Consolidation Coal Co., has assets of more than $100,000,000, with a net working capital of about $29,000,000 after allowance for acceptance by objecting Pittsburgh preferred stockholders of the cash offer of $100 a share for their holdings.

Two wholly owned subsidiaries were organized to operate the company's 43 mines in Pennsylvania, West Virginia and Kentucky. The new Pittsburgh Coal Co., headed by Mr. Morrow, will have about 115,000 acres of land with an estimated 775,000,000 tons of unmined coal. The new Consolidation Coal Co. will operate the properties of the old company, holding about 113,000 acres of land and about 600,000,000 tons of unmined coal. It will be headed, as before, by Mr. Love.

•

Revenue Act of 1945 Signed by President

President Truman signed the Revenue Bill of 1945 on Nov. 8. In its final form the measure repeals the excess profits tax as of Jan. 1, 1946, and retains for another year the carry back provisions. The corporate normal and surtax is reduced to 35 percent for incomes over $50,000; for incomes below $25,000, rates are reduced four percentage points, with a "notch" provision for $25,000-$50,000 incomes. The capital-stock tax and declared-value excess profits tax are repealed; an estimated 12,000,000 bottom-brackets taxpayers are dropped by exemptions of $500 a person against the 3 percent normal tax; individual surtaxes are reduced by three percentage points in each bracket and a 5 percent flat

Coal Mining News

KENNAMETAL UNDERCUTTER BITS CUT 35 PLACES (before regrinding) WHERE OTHER BITS AVERAGED ONLY 1

35 places cut between resharpenings through coal having clay veins—that's the average performance of Kennametal Bits in just one Pennsylvania coal mine. Furthermore, in nearby areas, where the face is clean, Kennametal Bits are cutting up to 250 places between resharpenings!

Before Kennametal Bits were used, operations in the mine had been seriously delayed because the previously used bits could cut, on the average, only one place, and then would have to be removed from the chain.

Why do Kennametal Bits make cutting-in operations practicable where previously the cost was prohibitive? Why do they retain their edge, and cut far more footage?

Because the cutting edge is Kennametal—the tough, durable tool material that is exceptionally hard (75 Rockwell C compared to 66 for hardest tool steels).

What do Kennametal Bits cost?

Their first cost is higher than that of other bits, but their ultimate cost is insignificant, taking into consideration the economies effected through their use.

Want to increase the productivity of your mining machines, and their crews?

Test Kennametal Bits under your operating conditions—and compare results. A note from you brings catalog particulars and prices, or our mining engineer—whichever you say.

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U1	U2	U3	U4
Short or Longwall Machines	Number 50, 52, 54 Chains	Mtd. Track or Rubber-Tired Gage	Mtd. Track or Rubber-Tired Gage
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Goodman	Goodman	Goodman	Goodman
Jeffrey	.....	Jeffrey	Jeffrey
Prox	.....	Prox	Prox
Sullivan	.....	Sullivan	Sullivan
Tracy	.....	Tracy	Tracy

Also Available

Six sizes of two-way Kennametal-tipped drill bits—1⅜", 1⅝", 1¾", 2¼", 2½", and 3"—to increase production rates and reduce costs of mechanical drilling operations. Solid-center, double-spiral augers that minimize whip, and make fullest use of the advantages inherent in Kennametal-tipped Drills, are made by us for use with all six sizes of bits.

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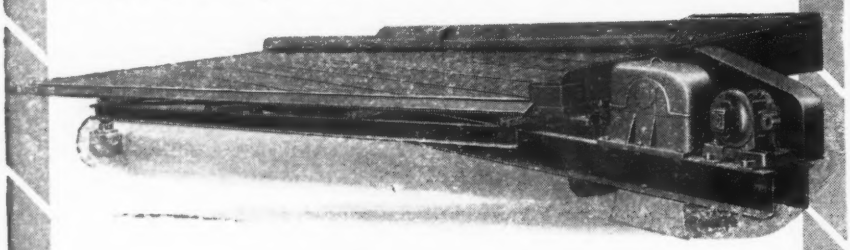

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Therefore, today, the *Diagonal* Deck utilizes full advantage of the natural obliquity of coal flow over a washing table. As a result coal is processed over approximately 75% *more effective working riffles* than can be workably provided on any rectangular table.

Consequently, a substantially greater table load of coal is handled effectively, and at the same time a much more efficient recovery is made from either anthracite or bituminous coal.

These facts are proved by the many years during which *Concenco's Diagonal Deck Tables* have given outstanding results and become the standard equipment at leading collieries and in the majority of reclamation installations. It is worth your time to investigate these efficient, profit-making tables — send today for Bulletin 119 and full details.

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reduction is applied to the total tax thus computed.

Employment taxes for the old-age and survivors' insurance program were frozen at the existing rates of 1 percent on wages paid by employers and 1 percent on wages received by employees No action was taken on the wartime excise levies, although the use tax on automobiles is repealed. Senator Vandenberg's amendment, which would have given corporations a minimum credit of $25,000 against their 1945 excess-profits tax, did not survive the meeting of Senate and House conferees.

•

Bituminous Institute Names Advisory Group

A six-man advisory committee has been appointed by the executive committee of the Bituminous Coal Institute to assist the institute in its campaign to keep coal as the nation's leading fuel, according to an announcement by Harry M. Vawter, director of the institute. Members of the new group are: Barton R. Gebhart (chairman), vice president, Chicago, Wilmington & Franklin Coal Co.; H. A. Glover, vice president, Island Creek Coal Co.; Harold Wright, vice president, Republic Coal & Coke Co.; M. L. Patton, vice president, Truax-Traer Coal Co.; A. H. Collins, vice president, Pocahontas Fuel Co.; and Murrel Crump, advertising manager, Hume-Sinclair Coal Co.

Mr. Vawter and the advisory committee are mapping out plans to put the institute in a position to render positive assistance to the retail coal merchants' associations throughout the country. A meeting of Mr. Vawter, the advisory committee and the American Retail Coal Merchants' Association will be held at an early date.

•

Anthracite A.I.M.E. Meets in Scranton

Anthracite section of the American Institute of Mining and Metallurgical Engineers held its fall meeting Oct. 26 in the Scranton Club, Scranton, Pa. With an attendance of around 150, "Drilling in the Anthracite Region" was discussed. Diamond drilling was covered in a paper by W. B. Petzold, mining engineer, Hudson Coal Co., and A. H. Harvey, mining engineer, Susquehanna Collieries Co.; H. A. Dierks, mining engineer, Glen Alden Coal Co., and H. H. Otto, assistant general manager in charge of engineering, Hudson Coal Co., submitted a paper on "Shot Drilling."

"Churn Drilling" was the subject of a paper by W. C. Muehlhof, chief engineer, Philadelphia & Reading Coal & Iron Co.; D. C. Helms, mining engineer, Lehigh Navigation Coal Co., and F. E. Kudlich, special engineer, Jeddo-Highland Coal Co. James Ross, president, Sprague & Henwood, covered the history of the development of drilling equipment. Many important points about drilling practices

CONTROLLED ATOMS or CONTROLLED LIVES

SINCE August 6th when the first atomic bomb was released over Hiroshima, the American people have been subjected to a continuous barrage of pronouncements on the use and control of atomic energy. Some of this comment has been strident, and much of it conflicting. A considerable portion of it has been of sincere and constructive excellence.

It has not been easy to separate the wise counsel from the merely noisy, and it is small wonder that the minds of many are troubled and confused.

However, the sheer mass of discussion poured into press and microphone has awakened us all to the gravity of the issue. In terms of any problem on which Americans ever have been called to exercise a judgment—This is It!

Even the dullest now recognizes that atomic weapons hang over modern civilization like the Sword of Damocles, and understands in some measure how fragile and taut is the hair of political balance that holds it suspended.

From this point on, we need the coolest and most carefully considered judgment that can be brought to bear. Discussion highly charged with emotionalism will but increase the tensions both at home and abroad, and render wholly insoluble a delicately intricate problem.

What Is The Problem?

The major outlines of that problem now are coming into focus in understandable terms:

1. The scientists have opened up a new and virtually unlimited storehouse of energy, and the engineers have discovered how to turn it into a military explosive incomparably more powerful than any we have known. We know that this energy may also be used to produce heat for useful power, and we suspect that the radioactive substances produced by the process in hitherto unimagined quantity may also have medical, industrial, and other constructive applications.

2. Terrifying as have been the demonstrations of the atomic bomb thus far, we know that they are as nothing in comparison with its potential destructiveness. The explosive force of individual bombs can be increased tremendously, and means for their effective delivery to predetermined targets in wholesale quantity already are at hand. The experts tell us that no practicable means of interception can be devised, and that reprisal in kind probably will be the only answer to an enemy attack with atomic weapons.

3. So far as we can see now, even successful retaliation would be at best an answer of hollow effect. Any two nations each having wholesale stock-piles of bombs could accomplish the practical destruction of each other. Since a first treacherous blow might well constitute an enormous advantage, a nation actuated by a ruthless urge to conquest or revenge might have the best chance of survival. But since the widest possible dispersal of bombs and launching units would be dictated by the strategy of atomic weapons, it is doubtful that one nation could destroy another without itself suffering destruction. On both sides the major centers of population could be wiped out, and the nation of least concentrated industrialization and commerce would suffer least. However, no one can be sure that the concentrated explosion of as many as 20 thousand atomic bombs would not poison the atmosphere of the world to an extent that would be fatal to great masses of population, not only within the country bombarded, but perhaps in the country which launched them.

4. The problem is further complicated because, so far as we know now, any large-scale commercial use of atomic energy as a power source is more or less inextricably linked to a potential military use. It is true that, if atomic power becomes economically feasible (which is by no means certain for a long time to come), it would require only low-grade concentrates of fissionable material, which would need further elaborate and costly processing before reaching explosive potential. But the process of producing such low-grade concentrates constitutes perhaps two-thirds of the industrial effort required to make effective bombs. It follows, then, that if nations were to equip themselves to produce large quantities of low-grade concentrates for power generation, the effort required to develop large-scale bomb production would be materially reduced. Moreover, the maintenance of an effective inspection to police agreements not to produce bombs might be forbiddingly difficult if atomic power generation were allowed.

5. In addition to the major problem posed by the use of atomic bombs in international war, any nation which produces or possesses such bombs, or the fissionable materials with which they are loaded, faces still another in the danger of their falling under the control of paranoid elements in its own population.

What Are We Going To Do About It?

We face the hard fact that we have produced a weapon capable of destroying whole nations—perhaps even the whole world. Although we were importantly aided in its development by the nationals of other countries, we, together with Great Britain and Canada, now must take the initiative in deciding what shall be done with it. We have only two choices. We can try to keep this weapon as a monopoly of our own, or we can try to place it under broad international control.

Can We Keep It To Ourselves?

If we know one certain fact about the atomic bomb, it is that it cannot long be held as a monopoly of those nations which produced it.

If Nazi Germany had succeeded in developing the weapon first, it probably would have attempted to achieve world dominion, with utter destruction as an alternative. Such a course is not within our range of choice. It violates every principle for which we stand.

Much reckless nonsense has been uttered concerning the inability of other nations to master the scientific, engineering, and industrial problems involved. It is the virtually unanimous opinion of those who worked on the project that several nations today are fully equipped in science, engineering, and industrial organization to produce atomic bombs and to provide the means for launching them. At least one of these nations, Russia, has also access to an ample supply of the necessary raw materials. The only debate is over whether it would take three, or five, or ten years for her to marshal her resources to produce bombs in multiple thousands. Once such an atomic race were on, we have no reason to believe that Russia might not divert more resources to the task than we ourselves should be willing to put into it.

Additional nonsense is talked as to how we might attempt to cope with the problem of living in a world in which mutually suspicious or hostile nations faced each other, with stores of atomic weapons on both sides. We hear talk of dispersing our cities and even of moving underground. No one has seriously reckoned the difficulty or the cost of following such counsel of despair. Still less has anyone appraised the neurotic effect upon men's minds of living by any such preposterous formula, under continuously mounting tension day after day, and year after year.

Certainly, if we could find no way to prevent the competitive production of atomic weapons, we should be driven at least to the selective dispersion of our bomb-launching facilities, of certain key industrial establishments, and of our centers of government and governing personnel. We should be forced, also, to change our traditional requirement that only Congress can commit us to active war. We should be forced to organize ourselves as a police or military state, with our scientists regimented and muzzled, with all of us under constant surveillance against the smuggling and planting of time-bombs, and constantly alerted against attack through the air.

Before we commit ourselves to any such intolerable procedure, we should be mad not to explore all possible means for making it unnecessary.

The Only Feasible Alternative Is Effective International Control

This cardinal principle has been recognized in the statement of November 15th, issued jointly by President Truman, and Prime Ministers Attlee and King. Their statement frankly concedes that against atomic weapons there can be no adequate military defense, that no nation can command a monopoly of such weapons, that responsibility for eliminating atomic energy as an instrument of war and for devising safeguards over its use for the advancement of science and other peaceful and humanitarian ends rests upon the civilized nations of the world.

They propose that a commission be set up at once under the United Nations Organization to make recommendations: (a) for extending between all nations the exchange of basic scientific information for peaceful ends, (b) for control of atomic energy to the extent necessary to ensure its use only for peaceful purposes, (c) for the elimination from national armaments of atomic weapons and of all other major weapons adaptable to mass destruction, and (d) for effective safeguards by way of inspection and other means to protect complying states against the hazards of violations and evasions.

Already criticism is leveled at the wording of the statement, at alleged omissions, at the wisdom of choosing the United Nations Organization as the medium through which to seek agreement in view of the weaknesses of the UNO Charter.

None of these issues should be crucially important. What matters is that an invitation has been issued in good faith for the nations of the world to meet and decide upon means for assuring the elimination of weapons, the existence of which no one can afford to tolerate.

The decision cannot be other than international; it will require the best thought of the best brains the world can muster. The smaller nations have an equal stake with the large, and from them may well come the most fruitful suggestions. But Russia now holds the key to the success or failure of our proposal. If she accepts our invitation, no other nation will refuse.

Alternatively, there will be an international armament race paced by atomic weapons. It will mean an end of free science, a severe policing and regimentation of international travel and trade, and innumerable restrictions upon those individual freedoms which we have just fought so desperately to preserve. This is the dismal prospect if we fail to arrive at a genuinely international accord on the control of atomic energy. But even this interval would promise to last only for an uneasy period, until someone started pressing the push-buttons on the panel-boards of extinction.

The only permanent solution lies in finding means to eliminate war itself. That we cannot hope to achieve overnight, but we can, and do hope that the nations will now agree to eliminate atomic weapons and their radioactive by-products as instruments of war.

If they do that, we can move forward more surely to the constructive development of the incalculably valuable resources that science has newly opened to our use. And, we can hope also for a progressive improvement in international understanding.

Unless the nations can reach agreement on this paramount issue of atomic energy, it is difficult to conceive of any vital issue on which they might agree.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Co., Inc.

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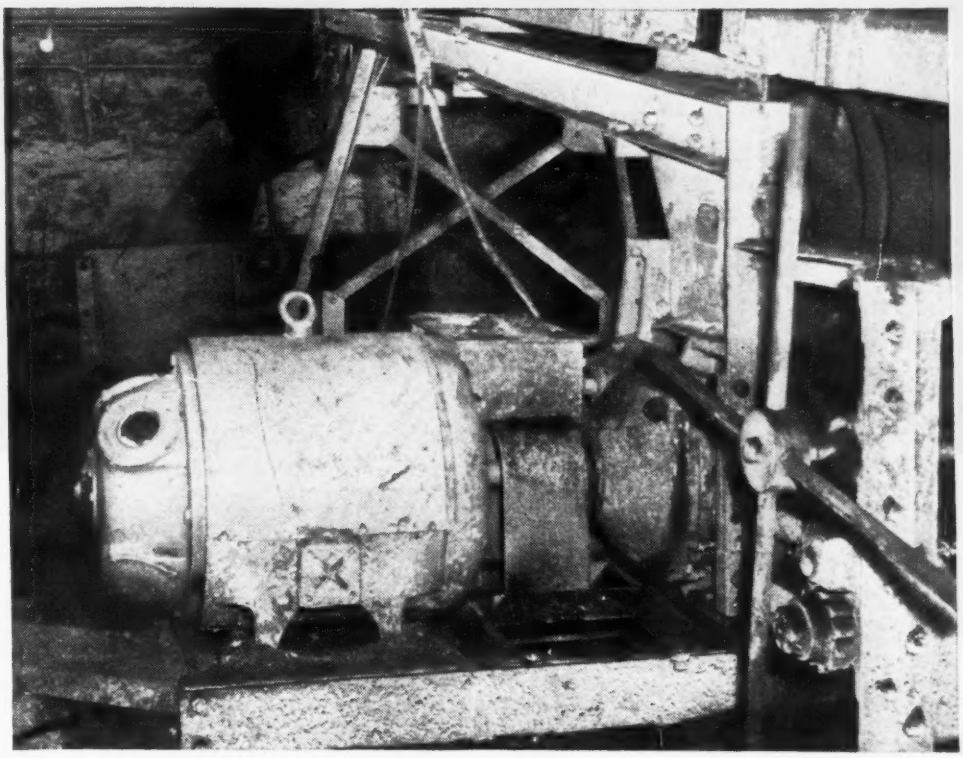

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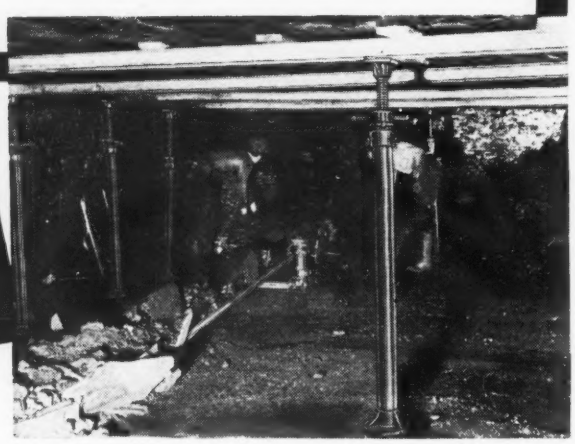

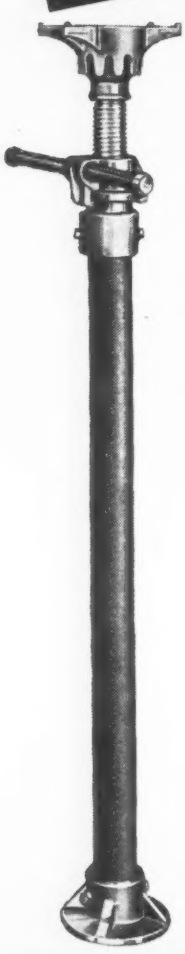

With the new Duff-Norton Mine Roof Jack, you can make your own jacks to the height you need by cutting 2" pipe sections to meet your height requirements and attaching the Duff-Norton base and top fittings. You eliminate the necessity for large stocks of various heights of roof jacks.

- **You buy only the base and screw fittings—cutting your own 2" pipe for height you need.**
- **To change height, simply change the fittings from one pipe to another—easy to attach.**
- **Pipe columns can be used over and over—you save on inventory expense.**

The new Duff-Norton Mine Roof Jacks are available in 2 models: MR-80—8 tons capacity, with a raise of 17", used with standard 2" pipe; MR-160—16 tons capacity, 17" raise, used with double strength 2" pipe. Heads for both models are made in 4 styles to suit all requirements—Ball and Socket, "H" and "I" for H-Beams or "V" for round timbers. Handles are available in 3 styles—slide, drop or wing nut.

WRITE for complete details on this new Mine Roof Jack, and on the standard Duff-Norton Mine Roof Jack.

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were brought out in a discussion following reading of the papers.

Inspection trips included the Sprague & Henwood plant, in which diamond drilling machines are made, and the new Wilkes-Barre-Scranton airport, under construction.

Among the attendants were twelve Chinese mining engineers studying mining methods in the Scranton area under the direction of Pierce Management.

W. C. M. Butler, Hazleton, is chairman of the Anthracite Section and Floyd S. Sanders, Wilkes-Barre, is secretary-treasurer. John S. Marshall, Scranton, was chairman of arrangements.

•

Maritime Pact Effects 2-Year Peace

Menace of a general strike in Maritime Province coal fields was averted Oct. 30, when the 12,000 miners in District 26, United Mine Workers of America, voted almost five to one to accept the National War Labor Board's recommendations for a new two-year contract with the operators. Rejection of the proposals in the referendum would have meant a general work stoppage at midnight Oct. 31 in the Cape Breton coal fields, in the eastern mainland section of Nova Scotia and in New Brunswick.

With only two of the district's 30 locals to report, the miners had voted 7,218 to 1,543 to accept the recommendations of the board, which provide for wage increases of 17c. per shift and two weeks' vacation with pay yearly instead of one. The increase is retroactive to last Feb. 1, when the previous contract expired. The new contract was to be signed within 30 days, another temporary extension having been granted in the meantime.

Adam Scott, district secretary-treasurer of U.M.W., said the union was "very well pleased with the result." The union's district and international officials who conducted the negotiations had recommended acceptance of the NWLB decision some time previous.

The wage increases and extra holidays, which will be taken this year between Christmas and New Year's, will be paid out of a fund provided by a 33c. a ton increase in the price of coal authorized Aug. 15 by the price board.

The union originally had asked for wage increases averaging $1 a day, and prolonged negotiations followed with the Carroll Coal Commission making an exhaustive survey of the situation in Maritime coal fields. Following the price board authorization of the coal price increase, negotiations struck another snag when the operators demanded a guarantee that production rates would be maintained to protect them from losses. The matter then was referred to NWLB.

The Canadian Coal Administrator has announced a revision in the rates of subsidy available to direct importers of United States anthracite because of a change in the exchange rate on U. S. funds from 11 percent to 10½ percent premium, effective Oct. 15. The subsidy rates previously established were stated in U. S. funds, whereas the present rates are stated in Canadian funds and will supersede those

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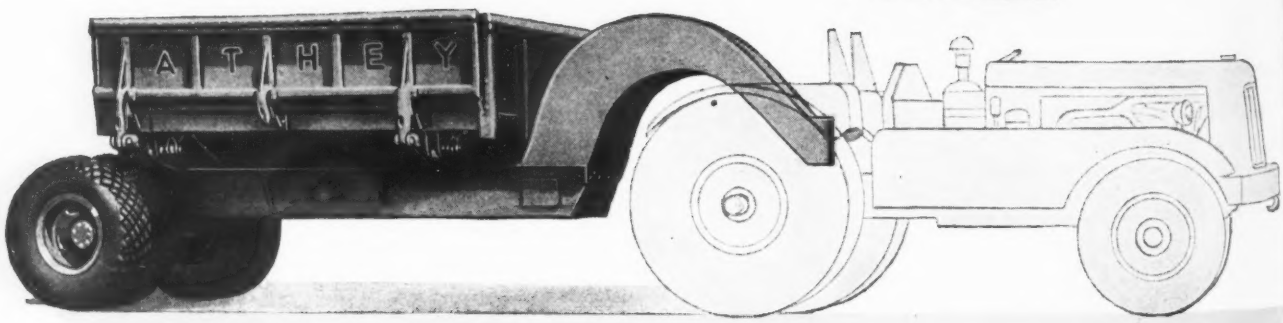
2-WAY DUMP — POSITIVE, HYDRAULIC CONTROLS
The new Athey PD-10 is 2-way dump — a money-saving advantage on many types of jobs; has fast-acting, positive hydraulic controls.



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established by C. C. 295. The effect of these revisions will be to permit the importer to invoice in accordance with the instruction of Sec. 5 of the Wartime Prices and Trade Board Administrator's Order A-1487. The Canadian importer is to invoice his retail dealer customers in the same net amount in Canadian funds as was the case before the change in foreign exchange rate on U. S. dollars.

•

Mining Division Takes Old Title Under CPA

With the Civilian Production Administration succeeding to the War Production Board, the Mining Division of WPB has resumed its former title: Mining Branch of the Metals and Minerals Division. Dr. Marcellus H. Stow, deputy director, has been appointed chief of the Mining Branch.

•

Freight Rate Advance Suspended Further

Further suspension until six months after the legal termination of the war has been ordered by the Interstate Commerce Commission in Ex Parte No. 148, Increased Railway Rates, Fares and Charges, 1942, already under suspension until the end of the present year.

•

Executive Committee Of N.C.A. Meets

Affairs of the National Coal Association were gone into in detail and consideration was given to the activities of its affiliated associations and groups by the executive committee of N.C.A., Nov. 15 and 16 at Hot Springs, Va., to determine if all of these units are coordinating their efforts to the best advantage in promoting the interests of the coal industry in all of the fields of activity in which they are engaged. Those present included Messrs. Alexander, Clark, Dickinson, Francis, Harrington, Ireland, Jamison and Stauffer, besides President McConnell and Executive Secretary Battle.

After considerable discussion the committee restated the position of the association on the efforts to unionize supervisory employees and again instructed all officers to do their utmost to preserve the rights of management to continue to manage its property and to use all lawful means to prevent unionization of supervisory forces.

Consideration also was given to certain phases of the wage and hour law that it is believed injures labor relations and actually works to the disadvantage of employees. The committee was strongly of the opinion that every effort should be made to correct some of the inequalities and injustices of the labor laws that affect earnings and efficiency.

Detailed affairs of the association were gone into with respect to publicity and public relations activities, all of which

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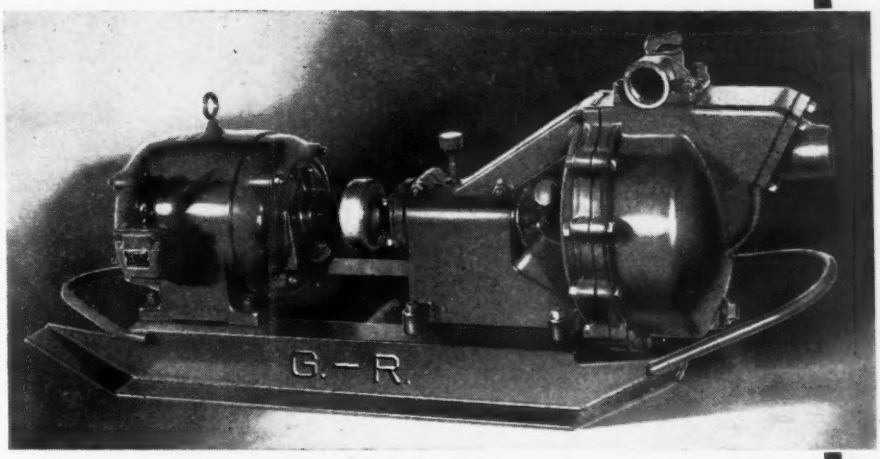

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For gathering service where absolute reliability and freedom from attention are essential, your best pump buy is Gorman-Rupp.

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EVERY COAL MINING PUMP NEED
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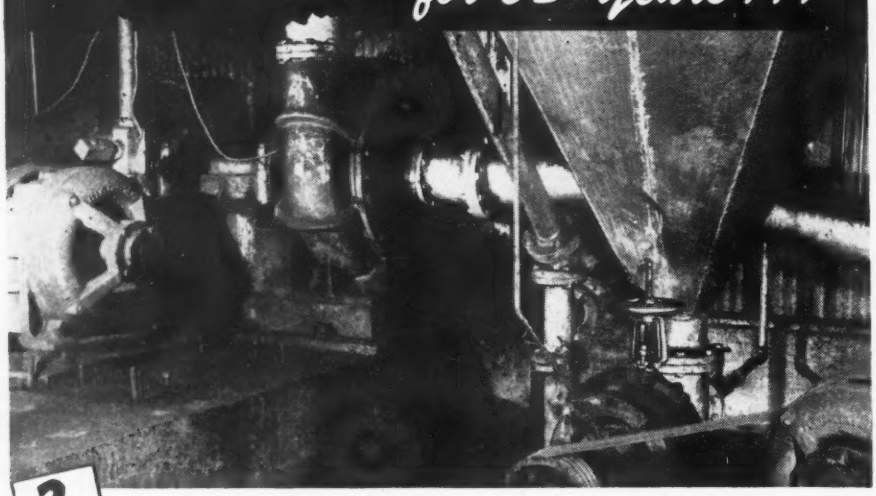

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have been curtailed somewhat during the war period, and it was the unanimous view of the committee that the association should again take a vigorous stand toward properly informing the public on all facts concerning the industry. To that end the following resolution was adopted:

"As a result of the extensive study of the economic conditions of the coal industry, we are convinced that the users of coal, our employees, the American public and our own people should be kept better informed as to the marked progress of the industry under trying conditions, the current situation in connection with our employee relations, research involving more convenient and extensive use of coal, and a better coordination of the manifold activities of the industry. And to that end we recommend a continued study of our economic conditions and a strengthening of our public relations department."

The committee reiterated the association's intention not to become involved in labor negotiations. Arrangements were made for a meeting of the board of directors in Chicago in the middle of January and it was announced that N.C.A. officers as well as officers of the Bituminous Coal Institute and Bituminous Coal Research, Inc., will meet at Pittsburgh at an early date to coordinate some of the activities of the three groups.

•

More Coal Controls Are Lifted

Restrictions on receipts of bituminous coal by consumers and requirement for filing a consumer declaration, as provided for in Sec. 602.716 of SFAW Regulation No. 27, have been revoked by SFAW as of Nov. 14. The same order cancelled subparagraphs (2) and (3) of Sec. 602.710 (c) (which were complementary to Sec. 602.716.)

SFAW issued Nov. 14 a direction to retail dealers urging the spreading of scarcer solid fuels and recommending the sale and use of other solid fuels such as reclaimed run-of-oven beehive coke or lower grades of bituminous coal in combination with the scarcer fuels. In complying with this direction, retail dealers are not violating OPA's tie-in sale regulation.

Amendment 5 to SFAW Regulation 27, issued Nov. 14, eliminates the use of consumer declarations on car-lot sales of coal to domestic consumers (as defined under the regulation).

SFAW, in a further statement issued Nov. 1 clarifying its position on shipments of coal produced in District 8 moving via the Great Lakes, said: "Shippers of coal produced in District 8 are not only permitted to fill commitments for such coal moving via the Great Lakes to any person at any point located on Lake Ontario, east of Toronto, or on the St. Lawrence River but are required to accord a first preference to such shipments to the same extent as the first preference is accorded to other lake commitments pursuant to the Notice of Direction and Statement referred to above" (Notice of Direction issued Sept.

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14 and Statement Concerning Preference Shipments, issued Oct. 18, and Notice of Direction to All Shippers of Coal Produced in District 8, issued Oct. 24, banning shipments via the lakes to lower lake ports).

Limitation of inventories on coke to a 20-day supply, decreed by WPB in Direction 4 to Priorities Regulation No. 32 (which became effective Oct. 15), expired Nov. 15. The same expiration date also has been attached to the WPB Utilities Order U-10, aimed to conserve coal by requiring that gas utilities having dual facilities for obtaining manufactured gas from water gas and from coal gas should operate the water-gas facilities to the maximum and reduce operation of coal gas facilities to the minimum. These expirations were provided for in amendments issued Nov. 6.

Personal Notes

G. R. SPINDLER, professor of mining engineering and director of the School of Mines, West Virginia University, has been named chief of the West Virginia Mines Department to succeed JESSE REDYARD.

W. H. SIENKNECHT, Knoxville, Tenn., has resigned as vice president in charge of operations of the Blue Diamond Coal Co. For the present ALEXANDER BONNYMAN, president, has taken over the work formerly handled by Mr. Sienknecht.

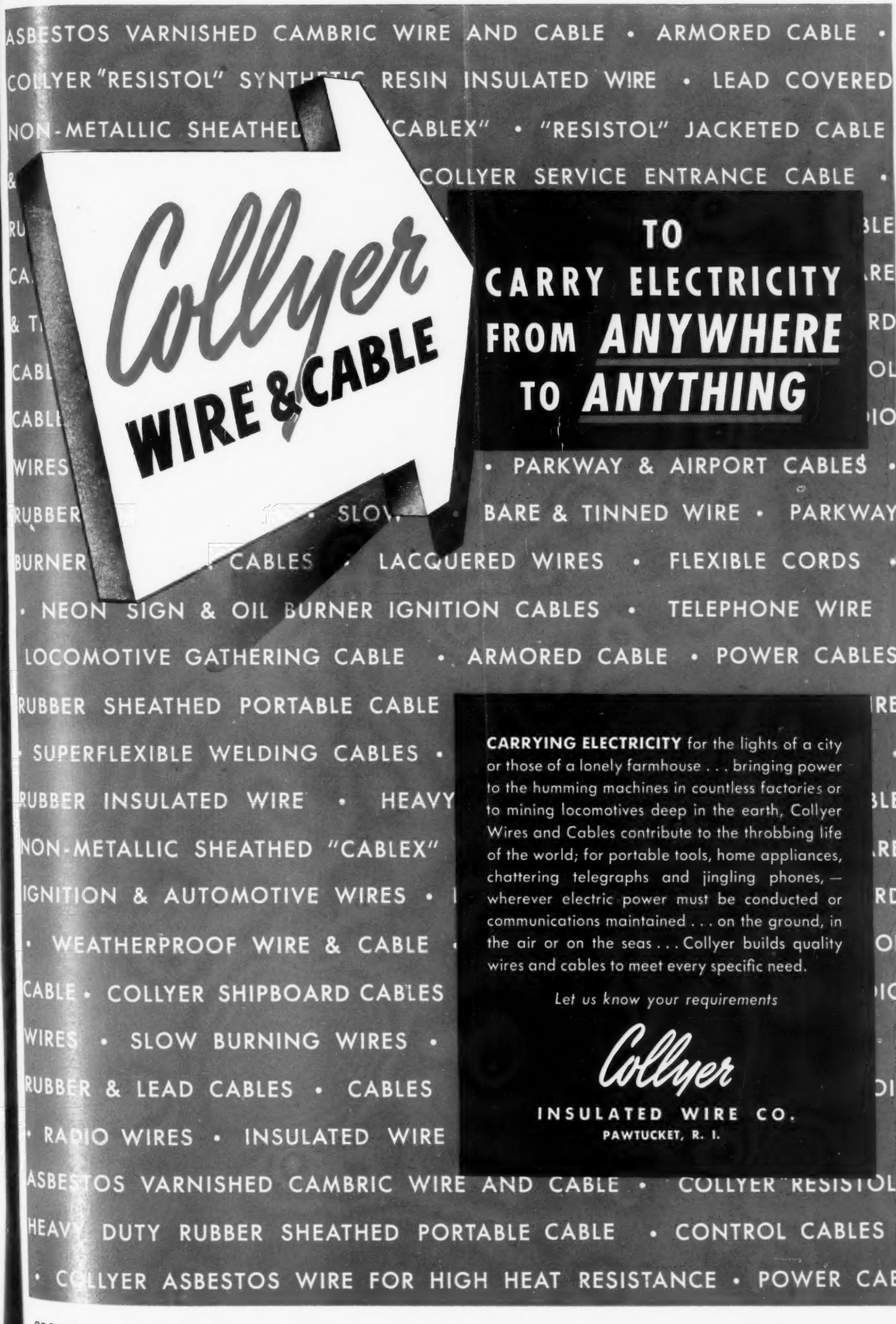
JOHN MAYHEW, Blue Diamond Coal Co., has been transferred from superintendent of Blue Diamond No. 1 mine, Blue Diamond, Ky., to superintendent of the new Leatherwood Mine, Leatherwood, Ky., which is now in the development stage. This mine is planned for an ultimate production of 2,000,000 tons a year.

H. P. MCDERMOTT, who has been with the Philadelphia & Reading Coal & Iron Co. for the last 40 years, has been elected vice president. HOWARD PRICE, for the last ten years secretary to the president, has been elected secretary of the company. Both changes were effective Nov. 1. WILLIAM G. FITZPATRICK succeeds Mr. Price as secretary to the president.

WILLIAM FRANCIS DIAMOND has been promoted to superintendent of Mine No. 1 of the Marianna Smokeless Coal Co., Marianna, W. Va. He worked for the Island Creek Coal Co. at Holden, W. Va., for about a year before being transferred to Marianna as chief of the cost control department, where he had been for the last four years.

DAVID CEXTON SIZEMORE, foreman, No. 2 mine, Marianna Smokeless Coal Co., Marianna, W. Va., has been promoted to superintendent of that operation. He started working for the Pond Creek Pocahontas Co. at an early age, being transferred to Marianna as soon as it started operation.

W. H. AMICK, general superintendent, Minden mine, New River & Pocahontas Consolidated Coal Co., Minden, W. Va., has been promoted to assistant to the general superintendent of the company.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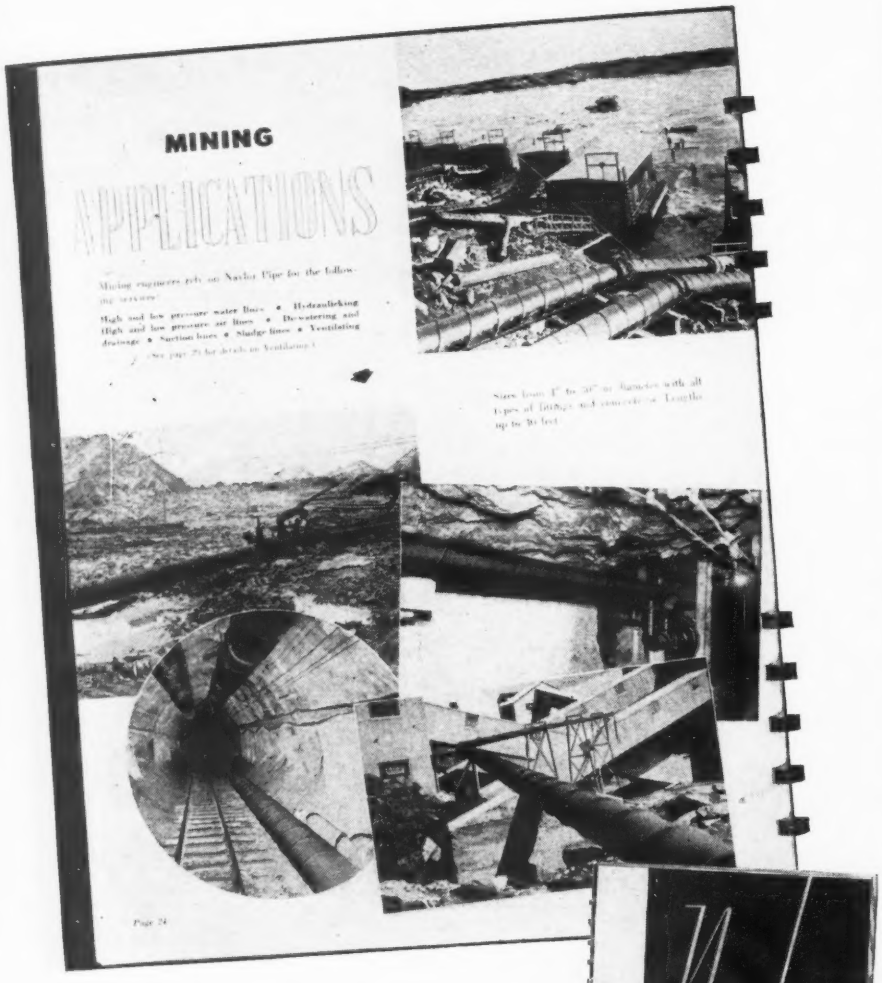

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ERNEST HILLMAN has disposed of his entire interest in J. H. Hillman & Sons Co. and has resigned as vice president of the Hillman Coal & Coke Co. and as an official of other interests affiliated with J. H. Hillman & Sons Co. These include Hecla Coal & Coke Co., W. J. Rainey, Inc., and Pittsburgh Coke & Chemical Co., with headquarters in Pittsburgh, Pa.

W. D. HAWLEY, superintendent at Long Branch mine, Koppers Coal Division, Long Branch, W. Va., has been transferred to Helen, W. Va., in a similar capacity.

LANCE REID has been promoted to mine foreman of No. 11 mine of the Koppers Coal Division, Helen, W. Va.

GEORGE LYLE ADDY has been appointed superintendent at D. O. Clark mine of the Union Pacific Coal Co., Superior, Wyo. After 23 years' service with the company, he succeeds GEORGE A. BROWN, who has retired at his own request after 40 years' association with the company, the past 19 as a mine superintendent.

HARRY M. TIBBS has been appointed personnel manager by the Union Pacific Coal Co., vice D. N. MACDONALD, who was appointed to the office when it was first set up. Mr. Tibbs went to Rock Springs, Wyo., from Denver, where he was in charge of the regional office of the War Manpower Commission.

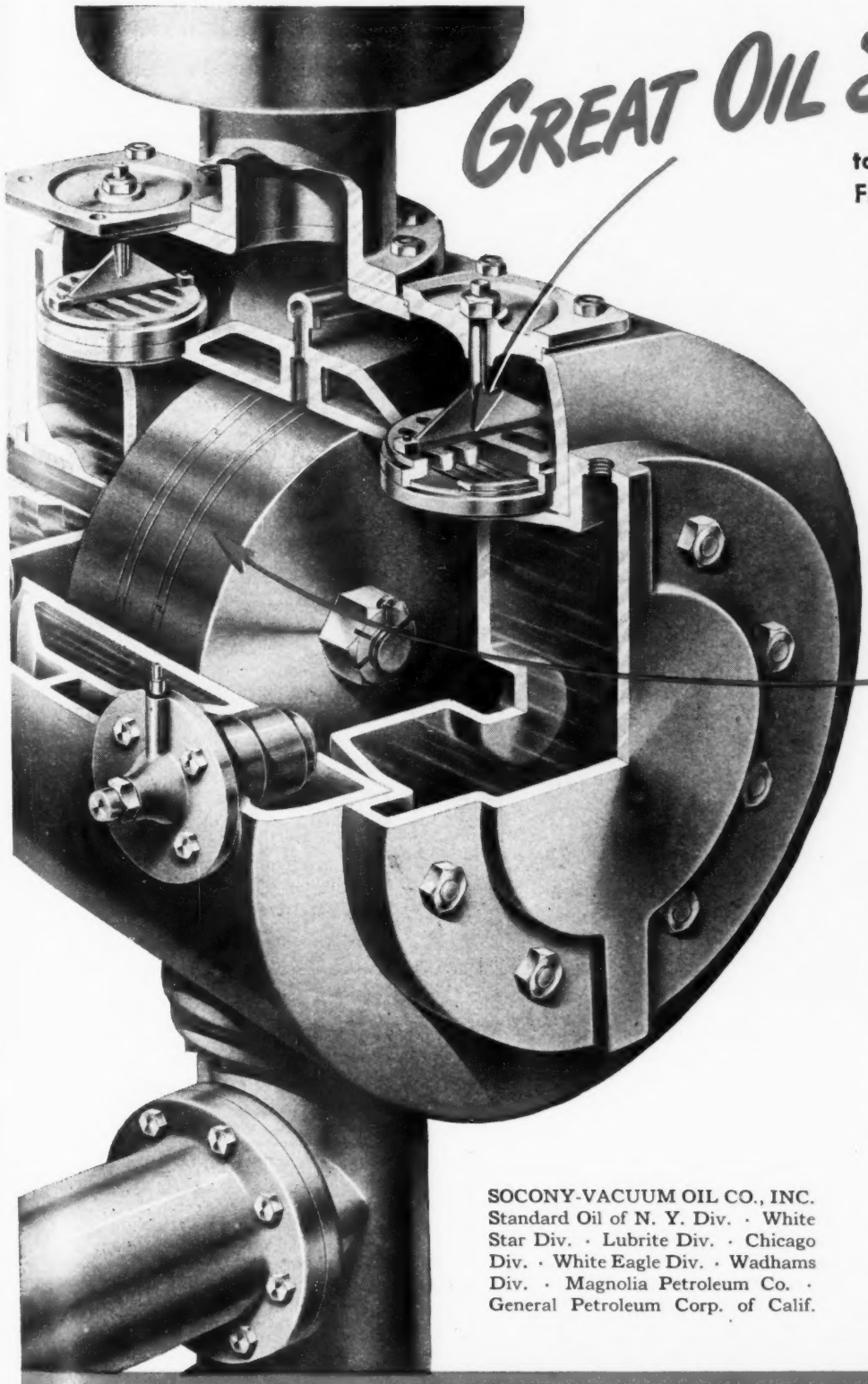
THOMAS D. MAURER, Trucksville, Pa., has been appointed secretary to the vice president of the Lehigh Valley Coal Co., Wilkes-Barre, Pa. He succeeds EDGAR GEORGE, who has retired after about fifty years' service with the company.

LT. COL. C. R. MABLEY JR., chief of the coal section, Fuel and Lubricants Branch, Office of the Chief Quartermaster, is now on terminal leave and will soon return to his position as assistant to the vice president of the Island Creek Coal Sales Co. Col. Mabley entered service in the Quartermaster Corps in 1942, and in the course of his duty was on detached service in Alaska as well as in Europe in connection with the Allied Coal Commission, planning the mining and distribution of coal and coke in liberated countries in Europe. LT. COL. J. ALDEN BOWERS, a mining engineer of long experience, who was called into the Army to serve in the Quartermaster Corps at the outbreak of the war, has been appointed new chief of the branch; MAJOR GEORGE A. WALLACE is assistant chief, and LT. C. B. LAKIN is chief of the inspection section and will handle the duties of the purchase section until further notice.

CAPT. HAROLD M. JONES, chief of the purchasing section, Fuel and Lubricants Branch, Office of the Chief Quartermaster, who entered the service in 1943, will soon join the Amherst Fuel Co. in sales promotion, preparation and production work, stationed in Richmond, Va. Prior to the war he was president of the Star Coal & Coke Co., which, until its property was worked out and it ceased operation, was owned for 51 years by the same family.

G. M. PATTERSON, formerly chief of

For Doubly-Safe Air Compressor Lubrication, You Need



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You can be sure of maximum freedom from valve-clogging deposits with Gargoyle D.T.E. Oils in your air compressor.

For these famous Socony-Vacuum oils possess high chemical stability to fight off the attacks of oxygen at hot discharge temperatures. By keeping valves clean and free, they prevent leakage, higher discharge temperatures and lower capacity.

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to Minimize Cylinder Wear

You get protection against wear as well as against deposits, when you rely on these proved oils. Their high lubricity minimizes metal-to-metal contact on rings, pistons, and cylinders *with* minimum oil feeds. This reduction in the amount of oil needed for correct lubrication, means less oil carried to the valves and the system, still another safeguard against deposits.

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the Kentucky Department of Mines and Minerals, has become a member of the firm of Robinson & Robinson, mining engineers, Charleston, W. Va. He will continue to reside in Lexington, Ky., where he has opened an office for the firm. A graduate of the University of Kentucky and of a course in business administration at Harvard University, Mr. Patterson was, before his appointment as chief of the Kentucky Department of Mines and Minerals, a coal-mine operator and consulting mining engineer in Bell and Harlan counties, Kentucky.

H. J. Griffith, manager of safety and welfare for the Jones & Laughlin Steel Corp., has been appointed as assistant to the general superintendent of the Vesta-Shannopin Coal Division, California, Pa.

David W. Jones, formerly consulting engineer on the staff of Paul Weir, Chicago, has been appointed general manager of the Simpson Creek Collieries Co., which operates in Barbour and Harrison counties, West Virginia. Mr. Jones entered mining via the electrical engineering route. In the early twenties he went from Arizona to become electrical engineer for the new Valier mine, in Illinois, and later was promoted to general superintendent. From there he went with the Princeton Mining Co., Indiana, as general superintendent of Kings Station mine. He left that position to become associated with Paul Weir.

Arthur Roberts, head of the engineering department for the Island Creek, Pond Creek Pocahontas and Marianna Smokeless Coal companies, Holden, W. Va., has accepted a position in the operating department of the Franklin County Coal Corp., Herrin, Ill.

R. Harry Thomas, Paintsville, Ky., acting chief of the Kentucky Bureau of Mines and Minerals, has been appointed chief of the department. Prior to becoming acting head of the department he was for two years a district mine inspector and before that was for eleven years assistant engineer of the North-East Coal Co.

M. W. Bennett has been appointed general manager by the Coast Fuel Co., now developing and operating coal properties in the Coos Bay section of Oregon.

Leonard C. Ford, assistant foreman at Frederick mine of the Colorado Fuel & Iron Corp., Valdez, Colo., has been appointed mine foreman there, vice Luke Egan, deceased. Mr. Ford has been a C. F. & I. employee 20 years.

Carl A. Marshall has been employed by the Fairmont Coal Bureau, New York office, to assist in its expanded program.

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Equipment Approval

One approval of permissible equipment was issued by the U. S. Bureau of Mines in October, as follows: Brown-Fayro Co.—Types HKL and HKM car-spotting hoist; 5-h.p. motor; 230 volts, d.c.; Approval 541; Oct. 2.

Give 'em Air TO UP TONNAGES

Back up your man power with plenty of air-power! Gardner-Denver "RX" and "HA" Horizontal Water-Cooled Air Compressors assure an ever-ready source of compressed air for every mining need.

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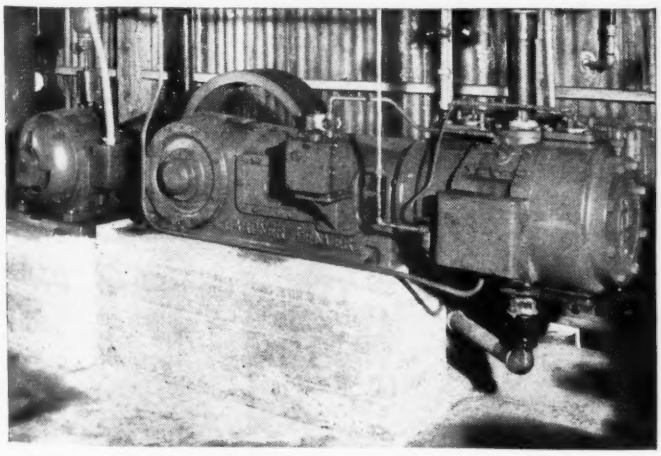
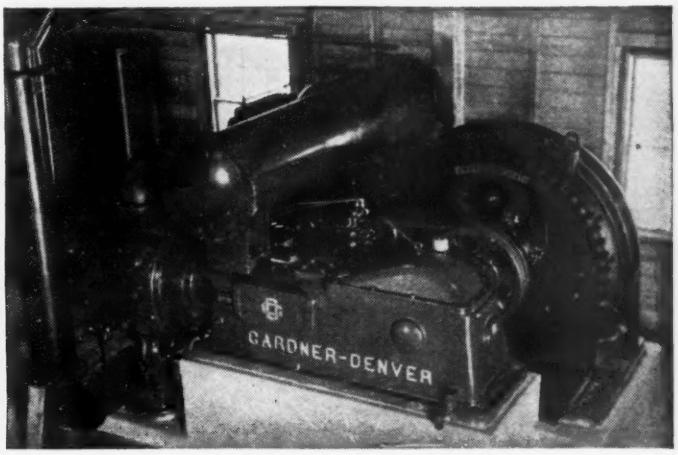
For complete information, write for illustrated bulletins. Gardner-Denver Company, Quincy, Illinois.



• Gardner-Denver "RX" Horizontal Single Stage Compressor. Capacities range from 89 to 1292 cubic-feet displacement per minute.



• Gardner-Denver "HA" Horizontal Two Stage Compressor. Capacities range from 316 to 2012 cubic-feet displacement per minute.

NOTE THESE *"Plus"* FEATURES

- Extra large water jackets assure a cooler-running compressor for higher efficiency and lubrication economies.
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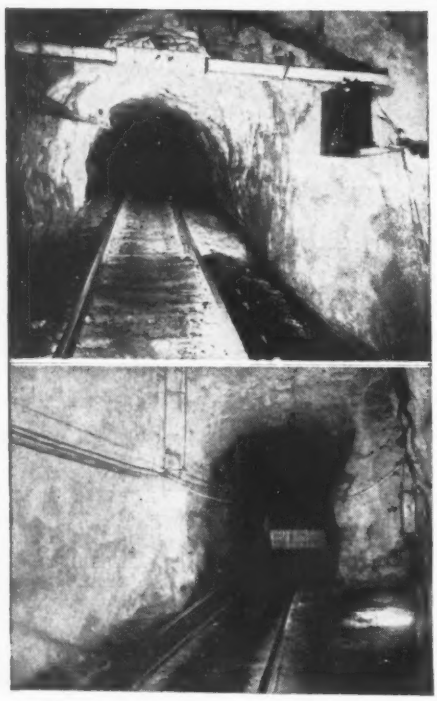

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1. Elimination of roof fall hazards, and attendant cleaning up.
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3. Additional head room and better visibility due to the light colored "GUNITE" surface.
4. Clean entries and passageways.
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6. Surface of "GUNITE" retains rock dust readily.
7. Lower mine maintenance costs.

We sell the equipment or we do the work by contract. Write today for your free copy of our new Bulletin D-2300.

MANUFACTURERS OF THE "CEMENT GUN"

Name Delegates To I.L.O. Meeting

Col. Robert P. Koenig, president, Ayrshire Collieries Corp., Indianapolis, has been named as official representative of the bituminous coal industry to attend the meeting of the Coal Mining Committee of the International Labor Organization, which is to be held in London, England, beginning Dec. 5.

Each member country is to have two government representatives, two employer organization representatives, and two representatives of trade unions. The delegates are named by the Secretary of Labor, but the National Coal Association was asked to nominate a representative for the bituminous industry, and it designated Colonel Koenig, who has agreed to serve. H. J. Connolly, president, Pennsylvania Coal Co., has been nominated by the Anthracite Institute as its representative.

The two representatives of union labor, both nominated by the United Mine Workers, are Thomas Kennedy, U.M.W. secretary-treasurer, and John T. Jones, president, District 16, U.M.W. The government representatives on the U. S. delegation are George Lamb, assistant director, U. S. Bureau of Mines, and Dr. Witt Bowden, labor economist in the Bureau of Labor Statistics.

•

Obituary

L. C. Ilsey, 65, pioneer in development of electrical equipment for coal mines and retired head of the electrical section of the U. S. Bureau of Mines in Pittsburgh, Pa., died Nov. 23 at his home in Penn Township, Pa., after an illness of five months. A graduate of Worcester Polytechic Institute, he joined the Bureau of Mines in 1910 and immediately began research into the use of electrical mine equipment and safety devices. He was made head of the electrical section in the Pittsburgh bureau in 1919 and held that position until he retired one year ago.

William R. Dugger, 94, one of the founders of the town in Indiana that bears his name, died there Oct. 28. He pioneered in the coal industry in Cass Township, and the town grew up around this industry.

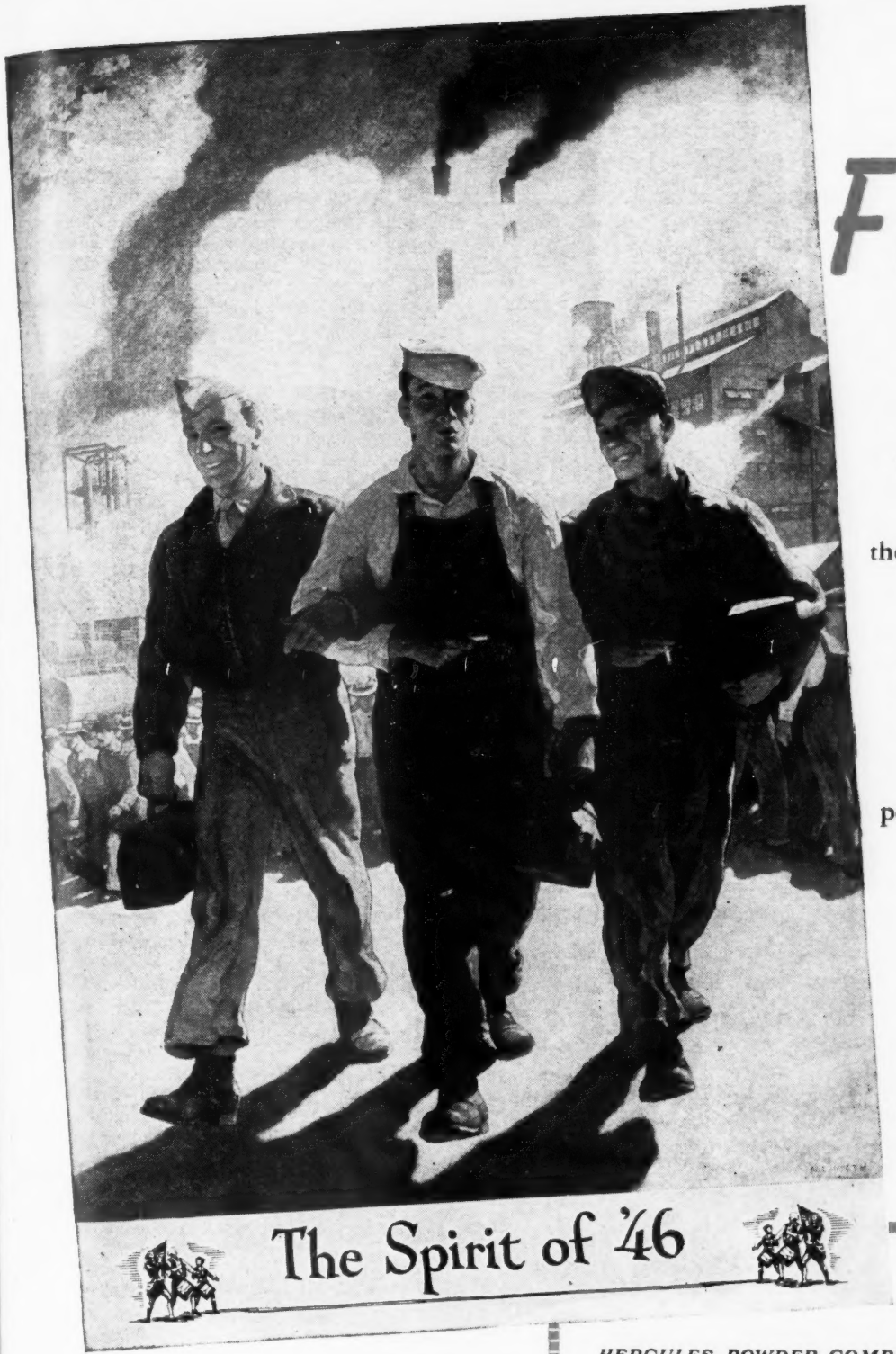
A. J. Musser, 71, vice president and general manager of the New York Central R.R. mining department, with operations in central Pennsylvania, Ohio, and Illinois, died Nov. 8 at his home in Indiana, Pa. He had been in failing health for about a year. He also was vice president of the Central Pennsylvania Coal Producers' Association as well as a member of its board of directors.

•

Preparation Facilities

Stevens Coal Co., Westwood Colliery, Tremont, Pa.—Contract closed with Wilmot Engineering Co. for one 16-ft.-diameter Wilmot Hydrotator to prepare No. 5 buckwheat coal; feed capacity, 50 t.p.h.

Hydrotated Anthracite Fuel Co., Milnesville, Pa.—Contract closed with Wilmot Enigneering Co. for one 7-ft.-diameter Wilmot Hydrotator to prepare



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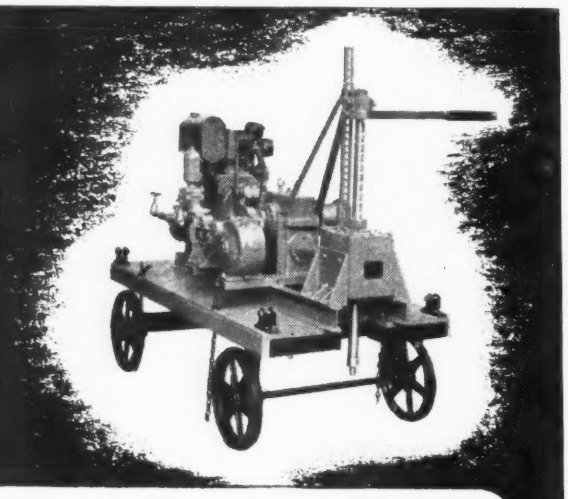

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Acker Drills are simple to operate and easy to move in rough country.—They can be mounted on a small motor truck—drag—or trailer.

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Determine depths of overburden before strip mining and thickness and quality of coal seams.

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Tools and equipment for all sub-surface exploration.

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No. 4 buckwheat coal; feed capacity, 50 t.p.h.

Otto Collieries Co., Ashland, Pa.—Contract closed with Wilmot Engineering Co. for three 6-ft.-diameter Wilmot Hydrotators, one to prepare No. 1 buckwheat; feed capacity, 45 t.p.h.; one to prepare rice coal; feed capacity, 40 t.p.h.; and one to prepare barley coal; capacity, 35 t.p.h.; also for one 7-ft.-diameter Wilmot Hydrotator to prepare No. 4 buckwheat; feed capacity, 50 t.p.h.; also for one 16-ft.-diameter Wilmot Hydrotator to prepare No. 5 buckwheat coal; feed capacity, 50 t.p.h.

Ecco Mfg. Co., Pine Grove, Pa.—Contract closed with Deister Concentrator Co. for three SuperDuty Diagonal-Deck washing tables to handle No. 4 buckwheat.

Freeman Coal Mining Corp., Seymour Mine, Herrin, Ill.—Contract closed with Roberts & Schaefer Co. for complete tipple and preparation plant, capacity 400 t.p.h. of min-run from Seymour mine and facilities to unload and prepare 400 t.p.h. from outside mines; plant to be equipped with Menzies Hydro-Separator to clean 1½x6-in. coal and Stump Air-Flow cleaning units to dry-clean 0x1½-in. size. The tipple will have five tracks complete with loading booms and will make all the standard Illinois and dedusted sizes; plant to be in operation July 1, 1946.

Chicago, Wilmington & Franklin Coal Co., New Orient Mine No. 2, West Frankfort, Ill.—Contract closed by Allen & Garcia Co., engineers, with Roberts & Schaefer Co. for complete Stump Air-Flow equipment to treat 320 t.p.h. of ⅞-in. x 48-mesh coal and 90 t.p.h. of 10x48-mesh coal; to be completed March 1, 1946.

Knott Coal Corp., Anco, Ky.—Contract closed with Roberts & Schaefer Co. for Hydro-Separator cleaning equipment to treat 6x2-in. egg coal; capacity, 85 t.p.h.; installation to be completed Feb. 1, 1946.

Red Parrot Coal Co., Mine No. 5, Prenter, W. Va.—Contract closed with Kanawha Mfg. Co. for central preparation plant to handle coal from Nos. 2 and 5 mines; consisting of washing plant for 0x5-in. coal with Jeffrey 84-in. three-compartment Baum jig, middlings crushing and recirculating system, high-speed shaker screens for primary dewatering and classifying, fine-coal dewatering on Allis-Chalmers low-head vibrator, 0x¼-in. passing through a centrifugal dryer; water will be clarified in large-area concrete settling tank; five sizes will be loaded with facilities provided for reassembling; soft coal hand picked from lump will be crushed and reassembled either raw or washed; refuse disposal by long belt conveyor to bin on mountainside for final disposal by electric larry; coal will be brought from No. 2 mine in railroad cars, dumped in track hopper and then conveyed on inclined belt to head end of main shaker screens; No. 2 coal may be blended with No. 5 coal in desired percentages; capacity, 350 t.p.h.

Westmoreland Mining Co., White Station, Pa.—Contract closed with Centrifugal & Mechanical Industries, Inc., for equipment to dry 60 t.p.h. of 0x⅜-in. coal; probable date of completion, February, 1946.

Valley Forge Cement Co., West

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A FACT!! An exciting new world is in the making — out of the developments of science — before our very eyes. **A DEMAND!!** Every thinking American wants to know HOW these amazing achievements will shape the pattern of his present and future life. **A PROMISE!!** Starting in April, 1946, McGraw-Hill will publish a thrilling new non-technical general magazine that will interpret, month by month, the impact of the scientists' world-shaping as *it happens*.

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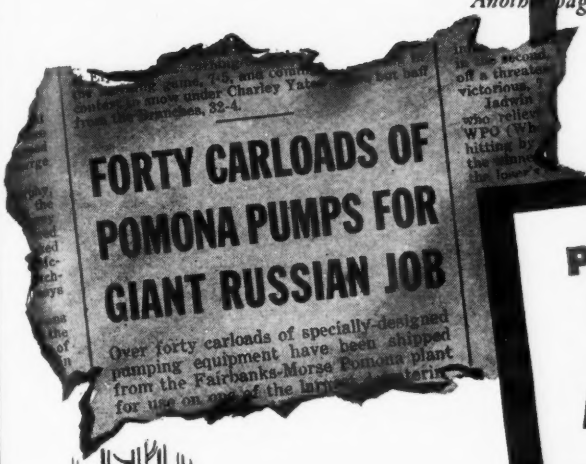
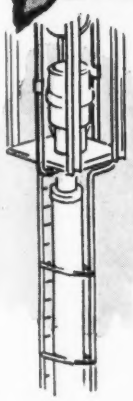
Another page from the widespread experience of Fairbanks-Morse pump engineers

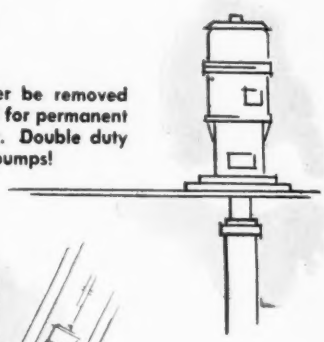

FORTY CARLOADS OF POMONA PUMPS FOR GIANT RUSSIAN JOB

Over forty carloads of specially-designed pumping equipment have been shipped from the Fairbanks-Morse Pomona plant for use on one of the lar

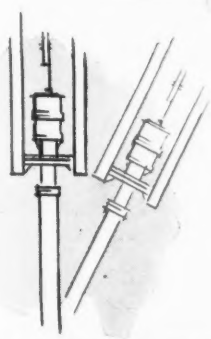
PROBLEM: To dewater 92 BILLION Gallons Against a THOUSAND foot lift!



Pump frames for Donbas job are unique in that they support not only the pump, but also the entire weight of discharge column!



Frames can later be removed and pumps used for permanent bore-hole work. Double duty from the same pumps!



F-M Pomona Pumps can be supplied to operate equally well whether suspended vertically . . . or laid at extreme angles in sloping tunnels, shafts, etc. — an important feature!

BECAUSE Fairbanks-Morse Pomona engineers are so widely recognized for their unusual skill with turbine pump installations, many unique pumping problems are brought to them. But this gigantic dewatering job for the Donbas mine region of Russia's Ukraine is so vast and complex it impresses even seasoned hydraulic engineers. To get some idea of the problems Fairbanks-Morse Pomona engineers encountered on this job, picture this situation . . .

Retreating German armies left vital mines in the Donbas region flooded with an estimated 92 BILLION gallons of water. That's enough water to flood knee-deep an area of *three hundred square miles* — a tremendous volume of water. Yet that's only part of the problem. Imagine this vast "lake" lowered a *thousand* feet underground into a honeycomb of twisting caverns and mine shafts. Add to this the further complication that the waters are not only highly corrosive, but also heavily-laden with abrasive materials that quickly eat the insides out of any ordinary pump.

The trick is to design pumping equipment capable of dewatering billions of gallons of corrosive, grit-laden water against a thousand foot lift . . . yet have the equipment sufficiently compact and portable to permit its being lowered through the mine passages to follow the water level.

One more requirement . . . to permit adding discharge pipe at the surface instead of deep in the shafts, the pump frames must support not only the pumps themselves, *but also the entire weight of discharge column clear to the surface!*

A mighty tough problem in pump engineering . . . but another difficult job that Fairbanks-Morse engineers took in stride. Some 40 carloads of specially-designed pumping units with working heads ranging from 918 to 1180 feet were required for this application. And the largest sizes of these pumps lift over 2½ million gallons per day *each* against a thousand foot head. *That's a lot of pump!*

But large capacity at high heads is only one of many features engineered into these pumps. They are amazingly compact and each incorporates unique corrosion and abrasion-resisting features that assure a maximum in trouble-free service. As an added bonus, the pumps are so designed they can later be removed from the portable frames and installed on permanent bore-hole pumping jobs for operating the mines *—a double return on the investment in Fairbanks-Morse pump ingenuity!*

The Fairbanks-Morse Pomona Pump is only one of a wide range of turbine pumps offered by Fairbanks-Morse, including water or oil-lubricated turbines with semi-open or closed impellers . . . Niagara Propeller and Mix-Flow pumps for low-lift high-capacity jobs . . . and Westco horizontal turbines for medium and small capacity applications. A letter, wire or phone call to your nearby distributor places this experienced pump engineering at your service. Fairbanks, Morse & Co., Fairbanks-Morse Bldg., Chicago 5, Illinois.

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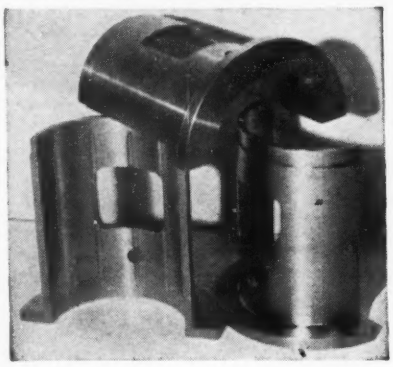

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Entire bearing surface wears uniformly without pitting. Manufactured entirely from pure virgin metals, perfectly alloyed and heat-treated. Unaffected by moisture. Simply heat to 900°-950° F. and pour. Can be heated to 2000° F. without burning or injury. Repouring only refires it. No appreciable shrinkage, hence a better contact with supporting shell, a more solid, rigid bearing. Contains practically no dross. Supplied in 10 lb. pigs.

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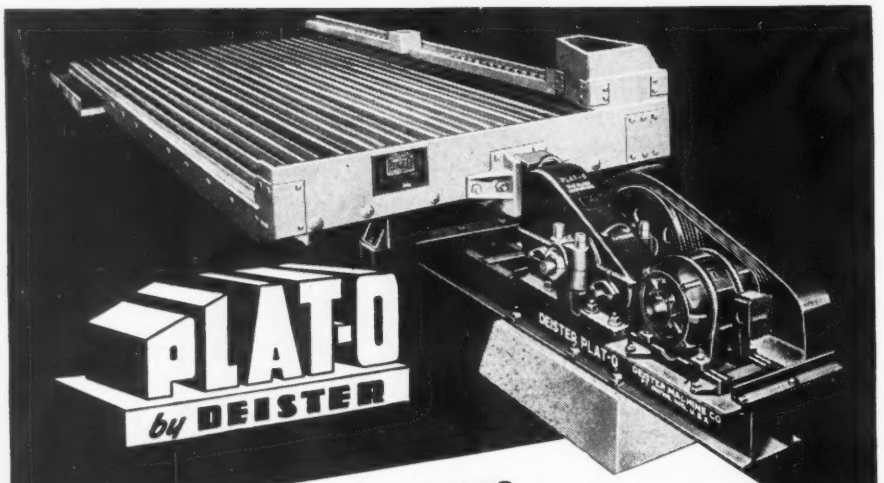

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Deister Machine Company engineers will be glad to help you apply Plat-O Tables to your operations . . . will be glad to show you, without obligation, how Plat-O Tables can increase your production and profits. Write today for complete details.

DEISTER MACHINE CO.
FT. WAYNE 4, INDIANA

Conshohocken, Pa.—Contract closed with Deister Machine Co. for two No. 16 Deister Plat-O washing tables to treat Nos. 4 and 5 river-bed buckwheat coal; capacity, 16 to 20 t.p.h., depending on the washability characteristics of the raw coal feed; has been completed.

ALLENTOWN PORTLAND CEMENT CO., Evansville, Pa.—Contract closed with Deister Machine Co. for two No. 16 Deister Plat-O washing tables to treat Nos. 4 and 5 river-bed buckwheat coal at a rate of 16 to 20 t.p.h.; completed about Nov. 25.

OAK RIDGE COAL CORP., Raven Run Breaker, Raven Run, Pa.—Contract closed with Menzies Separator Co. for one 4-ft. Menzies cone to clean barley coal; feed capacity, 22 t.p.h.; also one 4-ft. cone to clean No. 4 buckwheat; feed capacity, 22 t.p.h.

MUSKINGUM COAL CO., Misco, Ohio—Contract closed with Centrifugal & Mechanical Industries, Inc., through Jeffrey Mfg. Co. for equipment to dry 60 t.p.h. of 0x¼-in. coal; probable date of completion, Jan. 1, 1946.

HICKORY GROVE MINING CO., Latta, Ind.—Contract closed with Centrifugal & Mechanical Industries, Inc., for equipment to dry 40 t.p.h. of 0x5/16-in. coal plus 7 t.p.h. of float coal; probable date of completion, November, 1945.

PETERSON COAL CO., Deerfield, Ohio—Contract closed with Jeffrey Mfg. Co. for one single-compartment unit washer; raw feed, 150 t.p.h. 0x4-in. coal.

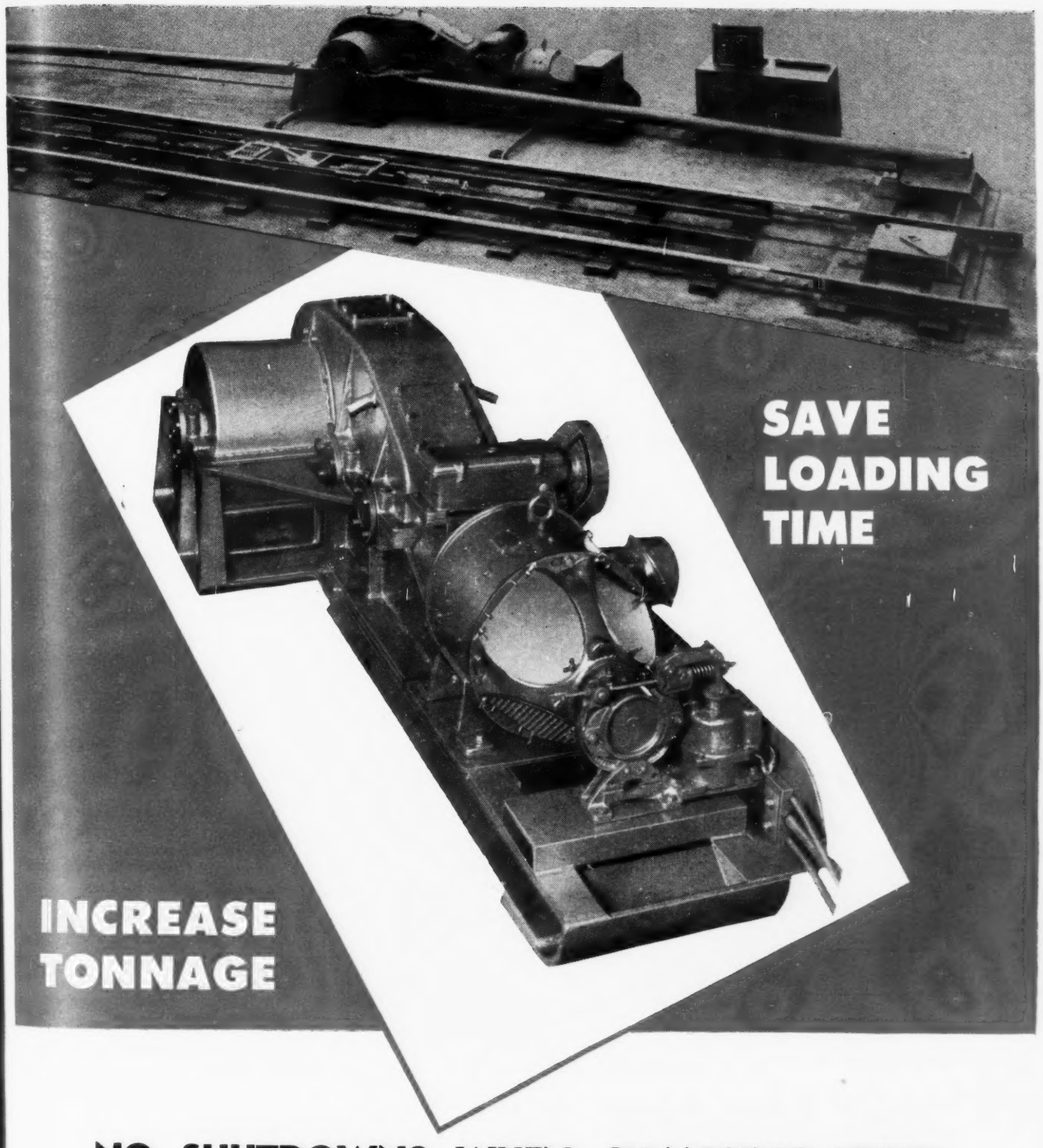
ALBUQUERQUE & CERILLOS COAL CO., Madrid, N. M.—Contract closed with Jeffrey Mfg. Co. for one single-compartment diaphragm jig to treat 3x⅜-in. coal; raw feed, 50 t.p.h.

RED PARROT COAL CO., Prenter, W. Va.—Contract closed through Kanawha Mfg. Co. with Jeffrey Mfg. Co. for one three-compartment 7-ft. six-cell Baum jig to treat 0x5-in. coal; raw feed, 400 t.p.h.

HUTCHINSON COAL CO., No. 9 Mine, MacBeth, Logan County, W. Va.—Contract closed with Fairmont Machinery Co. for plant consisting of Chance washer to clean 5x⅜-in. size and deliver clean coal to existing shaker screens, which will further size it into three loaded sizes; crushing facilities to be provided to reduce plus 5-in. lump to minus 5 in. before cleaning; capacity, 125 t.p.h. of mine-run; this is an addition to existing plant.

HUTCHINSON COAL CO., No. 11 Mine, Melville, Logan County, W. Va.—Contract closed with Fairmont Machinery Co. for plant consisting of Chance washer to clean 4x¼-in. coal and load two sizes from dewatering shaker screens; crushing facilities to be provided to reduce 4-in. to minus 4-in. after hand picking; capacity, 250 t.p.h. of mine-run.

YOUGHIOGHENY & OHIO COAL CO., Van Mine, Van, Boone County, W. Va.—Contract closed with Fairmont Machinery Co. for plant including Chance washer to clean 8x¼-in. size with facilities to load plus 8-in. coal after hand picking; included in the plant will be screening facilities to load plus 5-in. lump, 5x2-in. egg, 2x¾-in. nut and 0x¾-in. slack; mine-run capacity 330 t.p.h.; this is an addition to existing plant.



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Model HM Car Spotter is used to move cars past the loading point of mother belt conveyors where the loading rate is high and shut-downs to change trips must be avoided. The cars are pushed by a "barney" that travels in guides laid between the mine rails.

The hoist outfit as illustrated is complete, ready for installation. It is entirely self-contained, requiring no roof jacks or foundations, and comes in sections which can be handled easily in the mine.

Rated 12,000 lbs. rope pull at a hauling speed of 40 feet per minute with 15 HP motor.

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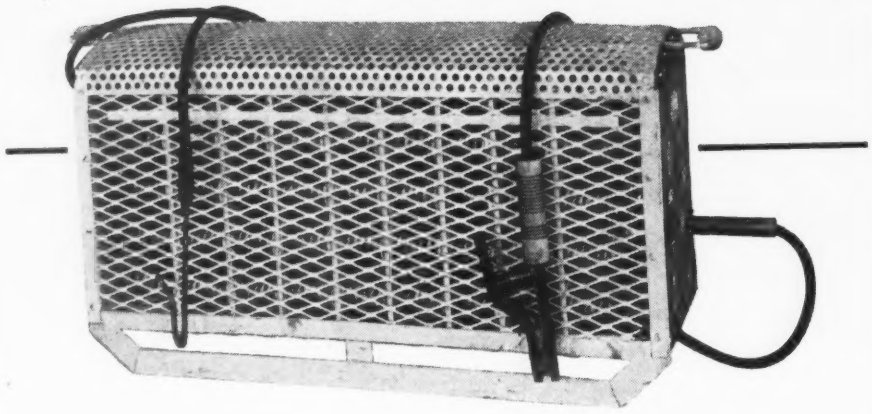

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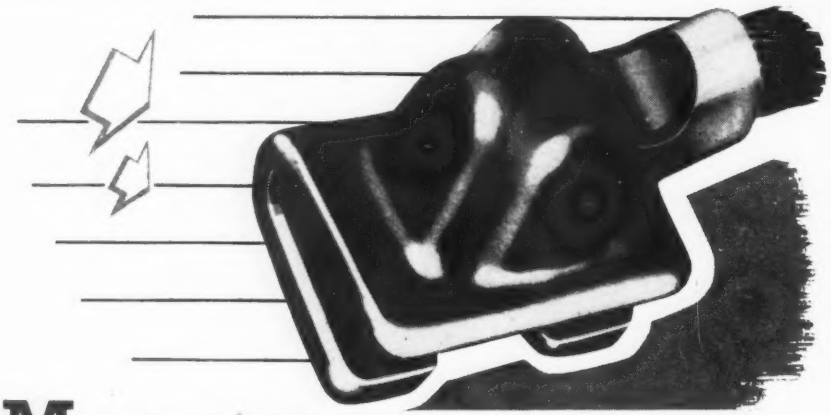


MESCOWELD RAIL BONDS

18 Types For every need

★ Pictured above, full size, is Mescoweld M8-F, a rail bond that has made rail bond history. A section of the shell has been cut away to show the perfect contact of cable with wrought steel terminal. Flash welding is of such nature that the end of every wire is in definite electrical contact with the terminal, assuring maximum conductivity. An extra recess in lower lip adds 15% to welding surface, thereby increasing conductivity. There are 18 Mescoweld types of rail bonds, satisfying every requirement. Write for catalog.

IMMEDIATE DELIVERIES • PHONE HEMLOCK 8332

MOSEBACH ELECTRIC AND SUPPLY CO.
1115 ARLINGTON AVE. PITTSBURGH 3, PA.

New Industry Helps Utah Coal Field

Fossil resins extracted from Utah coal by a newly constructed plant in Huntington Canyon are now being distributed commercially, according to Adrian Naglevoort, owner of the plant. The first shipment was sent to a paint and varnish establishment in Cleveland.

Mr. Naglevoort said the new Utah industry will raise the demand for coal through its byproducts and may lead to the establishment of related industries in the Emory-Carbon County area. Heretofore, all fossil resins have been imported from the Philippines and Asia, he continued.

•

Diesel Locomotives Show Steady Gain

Thirty-nine railroads, on which 98 percent of all the bituminous coal rail movement by Class I railroads originated, own 1,492 diesel locomotives, of which 1,202 are switch engines, according to a study covering the period July 1, 1940, to Sept. 1, 1945, and collated in tabular form by the National Coal Association. Diesels owned by carriers in this group aggregated more than one-half of all such equipment owned by Class I roads. All Class I carriers had about four times as many diesel locomotives on order Sept. 1 as steam locomotives.

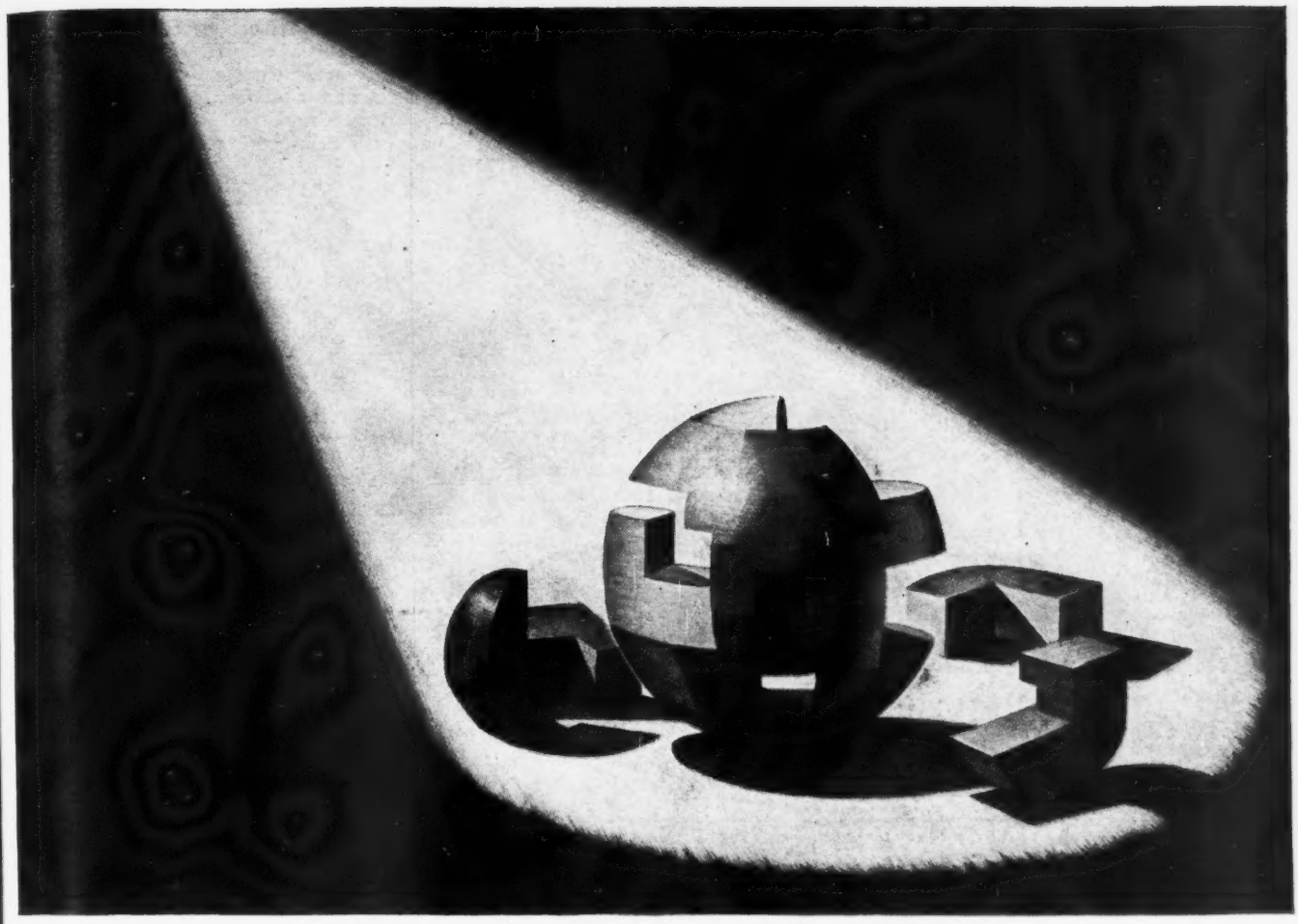
•

Association Activities

HARLAN COUNTY COAL OPERATORS' ASSOCIATION has elected as president A. F. Wakefield Jr.; vice president, C. V. Bennett; secretary, George S. Ward (re-elected); executive board—Pearl Bassham, Kenes Bowling, R. W. Creech Jr., W. J. Cunningham, S. J. Dickenson, J. S. Green, Charles S. Cuthrie, Elmer D. Hall, J. Springer Robinson, R. C. Scott and J. E. Taylor.

NORTHERN WEST VIRGINIA COAL ASSOCIATION reelected all its officers at its annual meeting. These included George S. Brackett, president; Thuman E. Johnson, secretary-treasurer; Thomas J. Johnson, Michael J. McAndrews and Thomas T. Reese, vice presidents. M. L. Alley, Gauley Mountain Coal Co., was elected to the board of directors, vice William Findley, Simpson Creek Collieries Co., resigned.

COAL TRADE ASSOCIATION OF INDIANA has elected as president Henry P. Smith, president, Princeton Mining Co. and Black Hawk Coal Corp., Terre Haute. O. L. Scales, president, Enos Coal Mining Co., Indianapolis, was elected vice president. Other officers are C. C. Lydick, managing director; R. C. Freytag, assistant managing director; H. V. Scott, traffic manager, and J. A. Thompson, auditor and statistician. Elected to the board of directors were: G. Don Sullivan, assistant to president, Ayrshire Collieries Corp.; W. S. Webster, vice president and general manager, Walter Bledsoe & Co.; Hugh B. Lee, vice presi-



The right wire rope is the *Solution* to every rope problem!

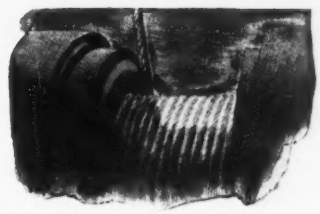
Selection of the *right* wire rope determines true rope economy. Every wire rope design is planned to resist a certain type of destruction.

For instance, few but heavy wires in the strands make a rope that long withstands abrasion but is not built to take bending. The rope made of many small wires resists bending but can't take too much abrasion.

Longest wire rope service results from the correct combination of resistance characteristics to meet the destructive forces present in each application.

Long, safe, economical life is *engineered* into every Wickwire Rope through modern wire-steel research and control—in our own laboratory. Here, the *right* characteristics can be accurately predetermined by scientific metallurgic control over the admixture and blending of steel-making elements.

Wickwire Rope quality is further safeguarded by the exact wire drawing procedure to fit the type of service which each finished wire rope is to perform.



Thousands of wire rope users—old hands and new—have found our specially prepared manual, "Know Your Ropes," valuable in making their work easier and prolonging rope life. It contains 78 "right and wrong" pictures, 40 wire rope life savers, 20 diagrams, tables and charts. Send for your FREE COPY today.

WICKWIRE SPENCER *Steel Company*

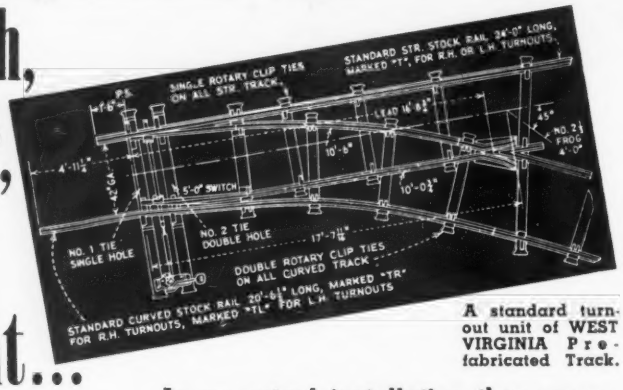
500 FIFTH AVENUE, NEW YORK (18), N. Y.

ABILENE (TEX.) • BOSTON • BUFFALO • CHATTANOOGA • CHICAGO • CLINTON (MASS.) • DETROIT • HOUSTON • LOS ANGELES • PHILADELPHIA • SAN FRANCISCO • TULSA • WORCESTER

A Wrench, Hammer, and a Blueprint... that's all you need to move

WEST VIRGINIA

Prefabricated Track!


SINGLE ROTARY CLIP TIES ON ALL STR. TRACK
STANDARD STR. STOCK RAIL 24'-0" LONG, MARKED "T", FOR R.H. OR L.H. TURNOUTS
LEAD 16'-8½"
45°
NO. 2½ FROG 4'-0"
10'-5"
5'-0" SWITCH
10'-0½"
NO. 1 TIE SINGLE HOLE
NO. 2 TIE DOUBLE HOLE
17'-7½"
DOUBLE ROTARY CLIP TIES ON ALL CURVED TRACK
STANDARD CURVED STOCK RAIL 20'-6½" LONG, MARKED "TR" FOR R.H. TURNOUTS, MARKED "TL" FOR L.H. TURNOUTS

A standard turnout unit of WEST VIRGINIA Prefabricated Track.

In an actual installation three men moved WEST VIRGINIA Prefabricated Track from 1½ rooms and delivered it to a new location in one shift. Almost no surfacing is required and derailments are practically nonexistent. Obviously you'll get more coal out faster on every shift with WEST VIRGINIA Prefabricated Track on the job! Write for full details.

WEST VIRGINIA STEEL & MFG. COMPANY
Formerly The West Virginia Rail Company
HUNTINGTON WEST VIRGINIA

FLEXIPIPE

The improved flexible tubing for mine and tunnel ventilation

This flexible air tubing is ready for immediate, easy installation. On account of its flexibility, it can be put up or taken down in a fractional part of the time required by a more rigid means of face ventilation.

Write for free sample and full information.

BEMIS BRO. BAG CO.
412 Poplar Street, St. Louis 2, Mo.

MORE HAULAGE FOR 20% LESS BATTERY CAPACITY

Double knee-action; better trackability. Floating power; less power consumption. Quick acting footbrake — essential for quick stopping, especially behind loading machines. Brake shoes that follow wheels (due to knee-action). Adjustable Timken Bearings throughout.

Huskiest transmission in any storage battery locomotive. Oil-tight; leakproof. Use regular auto oil; change every 6 months. Strong. Simple design. Low maintenance cost. Backed by over 25 years of experience with Storage Battery locomotives.

GREENSBURG "MONITOR"

Franklin County Coal Corporation at Royalton and Herrin, Illinois, have 12 of our Monitor type, storage battery locomotives.

All Greensburg Locomotives are CUSTOM-BUILT to your requirements

THE GREENSBURG MACHINE CO. 101 STANTON ST. GREENSBURG, PA.

dent and general manager, Maumee Collieries Co.; Philip H. Templeton, secretary-treasurer, Glendora Coal Co. and Linton-Summit Coal Co.; W. M. Zeller, president, Knox Consolidated Coal Corp.; Kenneth Ingle, secretary-treasurer, Ingle Coal Corp.; R. H. May, manager of sales, Sunlight Coal Co. and Tecumseh Coal Corp.; V. C. Kibler, treasurer, Blackfoot Coal & Land Corp.; Dr. R. E. Snoberger, president, Pyramid Coal Corp. and Shasta Coal Corp.; R. G. Nunn, vice president, Hickory Grove Coal Mining Corp.; and B. E. Lundblad, vice president-treasurer, Central Indiana Coal Co. and Sherwood-Templeton Coal Co.

NORTHEAST CHAPTER, Pennsylvania Society of Registered Professional Engineers, has elected as president Frank Shoemaker, general manager, Penn Anthracite Collieries Co. A committee was named to call upon the Scranton Council to recommend higher salaries for the City Engineer and his assistants, who are said to receive a much lower stipend than those in a number of cities of comparable size.

•

Coal Publications

Determination of the Size Distribution of Fine Coal Particles by the Electron Microscope, by J. T. McCartney, U. S. Bureau of Mines. R.I. 3827, 14 pp., 8x10½ in.; paper; mimeograph; free. When microscopes using ordinary light (which is a mixture of a multitude of rays of very different wave lengths) enlarge the object viewed to a degree beyond the recognized range of such instruments, they give a fringed and so an indefinite image of that object. Using ultra-violet light with its more nearly uniform wave length, a clearer image is obtained, but with the electron microscope, the edges of objects viewed are much more perfect or, to use the lingo of the microscopist, that type of microscope has "high resolving power." Availing himself of this fact, McCartney found that the Rosin-Rammler size parameters, as calculated from studies of the larger-sized coals, serve also for mixtures of particles from the same kind of coal, even when they are so small that only by floating them away with an air blast can they be separated from screenable coal. These fine dusts are designated "sub-sieve sizes."

Geology of Red Deer and Rosebud Sheets, Alberta, by J. A. Allen and J. O. G. Sanderson, Research Council of Alberta, University of Alberta, Edmonton, Alta. 115 pp., 6½x10 in.; paper covers. Price, 75c. In this area, bentonite is found in the sandstone roof and in partings up to 2 ft. thick, which separate two benches of coal. This mineral absorbs three times its weight and seven times its volume of water. With a little water it becomes soapy and, indeed, has been used as soap. With more water, it turns to a jelly. It is used in paper making, in the textile industry, for de-inking newsprint, for plaster board, wallboard, insulation blocks, in making rubber and paints, in sizing yarns, in dyeing as a water softener, as a beauty clay, in toothpaste, as a briquet, mold and core binder, as core wash in foundries, for absorbent medicinal dressings, as hoof

HOW MANY *of your Valves are draining Profits?*

When a valve is worn beyond the point of economical repair, it becomes a drain on profits. It may fail at a critical period in processing, ruining large quantities of materials controlled. It may interrupt production when its sudden failure forces a shut-down for repair or replacement. It is certain to require an excessive expenditure of maintenance time, labor, and materials.

Many valves have reached retirement age rapidly under the strain of wartime operation and neglected maintenance. Now that a plentiful supply of valves is in sight, management with an eye to future profits will plan early replacement of worn-out valves.

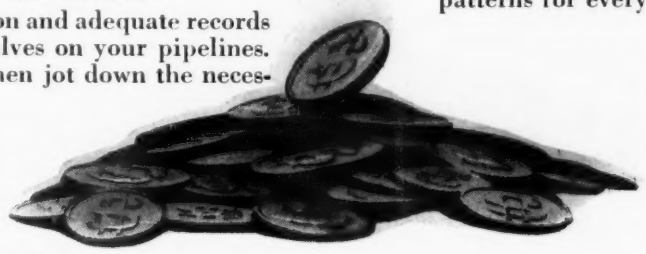
Jenkins Valve Record Sheets will help you cull out chronic cost-boosters

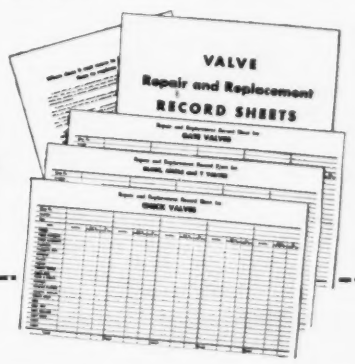
Only systematic inspection and adequate records will reveal the wornout valves on your pipelines. When your maintenance men jot down the necessary data on the simplified Jenkins Valve Record Sheets, you get a clear, complete picture of a valve's fitness for further use, – can tell at a glance whether repair will be economical, or replacement is advisable.

Your kit of Valve Record Sheets, including complete instructions, will be sent on request. Fill out and mail the coupon today.

Make replacements with Jenkins Valves

Because they are the product of valve specialists, whose leadership in design, choice of materials, and workmanship has long been recognized, Jenkins Valves are your best assurance of the *lowest cost in the long run.* Select the replacement you need from the Jenkins Catalog . . . over 600 patterns for every service.





Jenkins Bros., 80 White Street, New York 13; Bridgeport; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal; London, England.

LOOK FOR THIS JENKINS TRADE MARK DIAMOND MARK

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JENKINS VALVES

SINCE 1864

For every Industrial, Engineering, Marine, Plumbing-heating Service . . . In Bronze, Iron, Cast Steel and Corrosion-resisting Alloys . . . 125 to 600 lbs. pressure.

Sold Through Reliable Industrial Distributors Everywhere

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Send me a set of Jenkins "Valve Record Sheets"

Name .....

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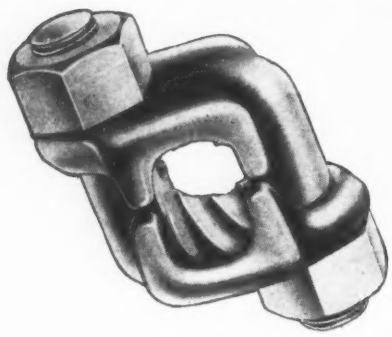
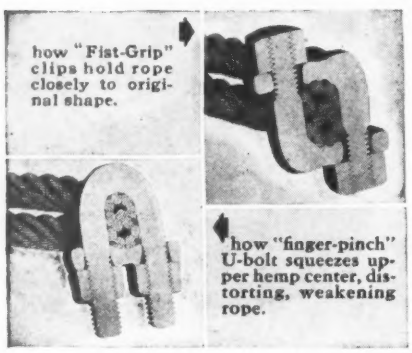
PROTECT

BETTER, PREFORMED ROPE WITH BETTER

"FIST-GRIP" CLIPS



Cross-section views (nuts tightened to same tension by torque-indicating wrench) show—


how "Fist-Grip" clips hold rope closely to original shape.
how "finger-pinch" U-bolt squeezes upper hemp center, distorting, weakening rope.

3 WAYS "FIST-GRIP" SAFETY CLIPS SAVE

1. *They Save Skill* by eliminating difficult, expensive splicing. Foolproof . . . can't be applied backward or upside down.

2. *They Save Metal.* Three "Fist-Grip" Safety Clips do work of 4 ordinary U-bolts. Improved bearing surfaces provide more friction. They save rope too because they don't crush or break it.

3. *They save time.* Easy and speedy to install. Fewer needed. No special wrenches.

Laughlin "Fist-Grip" Safety Clips are ideal not only for preformed wire rope but ordinary wire rope as well. The only clips with drop-forged bolts, their "Fist-Grip" is as strong as rope itself. Distributed through mill, mine and oil field supply houses. For a complete catalog on Laughlin's wire rope and chain hardware, write **Dept. 10.** The Thomas Laughlin Co., Portland 6, Maine.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

packing and dressing for animals, as soap filler, to refine gasoline and oils, as well-drilling mud, in cement, in ceramic products and in the cement industry, and for emulsions. In the mines, however, it is a first-class nuisance.

•

Bituminous Exports On High Level

Export of bituminous coal through Atlantic and Gulf ports is now reported to be about 2½ million tons per month, compared with slightly less than 2 million tons per month in the preceding two years. Figures on exports of all solid fuels from the United States for 1943 and 1944 are as follows:

Type of Fuel	1943	1944
Bituminous coal, tons	23,068,043	23,242,422
Anthracite, tons	3,695,250	3,737,440
Coke, tons	888,042	773,960
Briquets, tons	156,070	146,136
All solids fuels, tons	27,807,405	27,899,958

•

Allegheny Moves To End Smoke Pall

Commissioners of Allegheny County, Pennsylvania, moved Nov. 13 to draft an anti-smoke ordinance patterned after that of Pittsburgh and designed to reduce the smoke from steel mills, homes and business establishments. The commissioners ordered the County Law Department to draft a tentative anti-smoke law, under provisions provided by the Legislature in 1943.

Pittsburgh's ordinance, passed in 1941, contains basic provisions that have been postponed because of the war. Smoke-control advocates insist that to be effective anti-smoke laws must cover the entire county, as "smoke doesn't recognize municipal boundary lines." According to Pittsburgh Health Department statistics, there is an average of only 87 clear days a year in the Allegheny County area.

•

Mine Fatality Rate Shows Slight Reversal

Accidents at coal mines of the United States caused the deaths of 69 bituminous and 9 anthracite miners in September last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 46,330,000 net tons, the accident death rate among bituminous miners in September last was 1.49 per million tons, the same as in the preceding month and compared with 1.82 in September, 1944.

The anthracite fatality rate from accidents in September last was 1.95, based on an output of 4,613,000 tons, against 3.45 in the preceding month and 2.79 in the ninth month a year earlier.

For the two industries combined, the accident fatality rate in September last was 1.53, compared with 1.66 in the preceding month and 1.92 in September, 1944.

Fatalities during September last, by causes and States, as well as comparable rates for the first nine months of 1944 and 1945, were as follows:

U. S. COAL-MINE FATALITIES SEPTEMBER, 1945, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Explosives	Machinery	Total Underground	Shaft	Open-Cut	Surface	Grand Total
Alabama	3	..	..	1	..	4	..	..	..	4
Colorado	1	1	1	..	..	3	..	..	..	3
Illinois	2	..	1	..	..	3	1	..	1	5
Indiana	..	..	1	..	..	1	..	..	..	1
Iowa	..	..	..	..	..	..	1	..	..	1
Kansas	1	..	..	..	..	1	..	..	..	1
Kentucky	6	..	..	2	..	8	..	..	..	8
Ohio	1	..	..	..	..	1	..	..	..	1
Penna. (bit.)	5	..	3	..	..	8	..	1	..	9
Tennessee	3	..	..	..	..	3	..	..	1	4
Utah	1	..	..	..	1	2	..	..	..	2
Virginia	2	..	..	..	..	2	..	..	..	2
West Virginia	14	2	9	1	..	26	..	1	1	28
Total bituminous	39	3	15	4	1	62	2	2	3	69
Penna. (anth.)	7	..	..	1	..	8	..	..	1	9
Grand Total	46	3	15	5	1	70	2	2	4	78

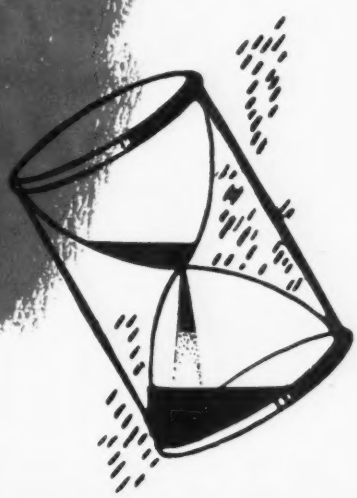
DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS*

January-September, 1944 and 1945

Cause	Bituminous: Number Killed		Killed per Million Tons		Anthracite: Number Killed		Killed per Million Tons		Total: Number Killed		Killed per Million Tons	
	1944	1945	1944	1945	1944	1945	1944	1945	1944	1945	1944	1945
Underground:												
Falls of roof and face	452	333	0.959	0.761	62	52	1.267	1.274	514	385	0.988	0.804
Haulage	171	151	.363	.345	17	18	.347	.441	188	169	.361	.353
Gas or dust explosions:												
Local	8	9	.017	.020	2	4	.041	.098	10	13	.019	.027
Major	22	39	.047	.089	...	...	...	...	22	39	.042	.082
Explosives	12	18	.025	.041	15	7	.307	.171	27	25	.052	.052
Electricity	28	17	.059	.039	3	2	.061	.049	31	19	.060	.040
Machinery	25	34	.053	.078	...	2	....	.049	25	36	.048	.075
Shaft	5	10	.010	.023	5	1	.102	.024	10	11	.019	.023
Miscellaneous	90	11	.191	.025	13	8	.266	.196	103	19	.198	.040
Stripping or open-cut	22	19	.047	.043	6	2	.123	.049	28	21	.054	.044
Surface	43	43	.091	.098	9	9	.184	.220	52	52	.100	.109
Total	878	684	1.862	1.562	132	105	2.698	2.571	1,010	789	1.941	1.649

*All figures subject to revision.

How long



WILL THIS SELLER'S MARKET LAST?

CLIFFS *Dependable* COALS

C I C

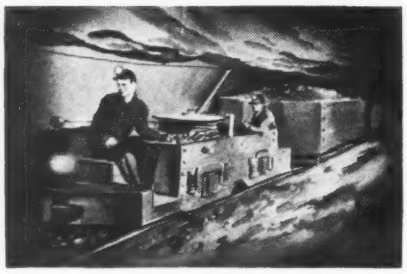
During World War II coal requirements exceeded production and stockpiles were reduced below the margin of safety. Planned selling was impossible. Coal was distributed under U. S. Government regulations and directives, regardless of price, preparation or quality.

In the post-war period, competitive conditions will be restored. Planned selling will again be necessary. Cliff's organization has been kept intact to properly represent the producers of Cliffs Dependable Coals.

Many producers do not now have proper sales representation to efficiently distribute their output. We welcome their inquiry.

THE CLEVELAND-CLIFFS IRON COMPANY

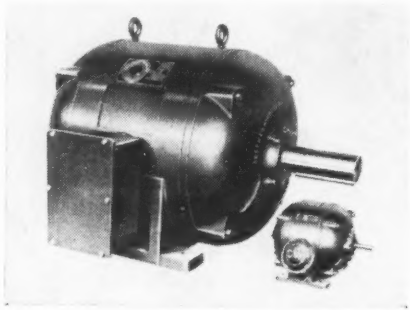
UNION COMMERCE BLDG. • CLEVELAND 14, OHIO



Equipment News

Protected-Type Motors

With the addition of three new frame sizes, designated as B58-A, B and C, the Crocker-Wheeler Division of Joshua Hendy Iron Works, Ampere, N. J., now offers a complete line of a.c. squirrel-cage pro-



tected-type motors from 1 to 200 hp. Priced the same as the conventional open type and rated 40 C. rise, full-load continuous duty, with a 15 percent service factor, these motors are said to provide full protection against dripping liquids, falling metal chips and other foreign matter.

Sizes built in N.E.M.A. standardized frames, 203 to 326 inclusive, have no openings in the frame or shields above the horizontal center line. N.E.M.A. standardized frames 326 to 505 as well as the three newly added larger sizes are basically the same in construction with the addition of two shielded air exhaust openings in the upper half of the frame. The company's patented centrifugal bearing seal, used in all ball-bearing machines, permits the use of softer grease for lasting lubrication and long bearing life.

Alucast rotors, in which the bars, fans and end rings are cast in one operation from aluminum alloys, is employed for sizes 203 to 404; rotors of larger sizes have copper bars with brazed-on fans and end rings. Stator coils of all sizes are protected by Vinylastic insulation.

•

Identification Labels

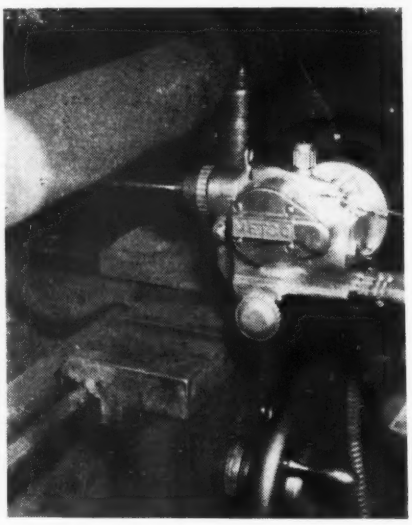
Quik-Labels have been developed by W. H. Brady Co., 2910B-E. Linwood Ave., Milwaukee 11, to speed up and simplify the marking or coding of wires, motor leads, harnesses, circuits, conduits, relays, coils, terminal boards, fuse blocks, cables, etc. They provide permanent legible identification and stick quick without moistening to any round or flat surface.

Precut to exact size, Quik-Labels come on handy code cards ready for instant use. Labels are peeled from the card by means of the self-starter feature that automatically exposes the ends of the labels, permitting them to be pulled off quickly without laborious finger picking or difficult prying of corners or edges. More than 200 different code cards are available, including 14 colors, to meet the requirements of all types of electrical production and maintenance problems.

•

Metallizing Gun

Metallizing Engineering Co., 38-14 30th St., Long Island City 1, N. Y., offers a new metallizing gun designed for heavy-duty continuous operation. Unlike the hand gun, the Type Y heavy-duty metallizing gun is designed and built specifically for mechanical mounting and continuous operation, its features including the use of $\frac{3}{16}$-in. wire and an acetylene pressure of only 15 p.s.i. Gears, worms and bearings

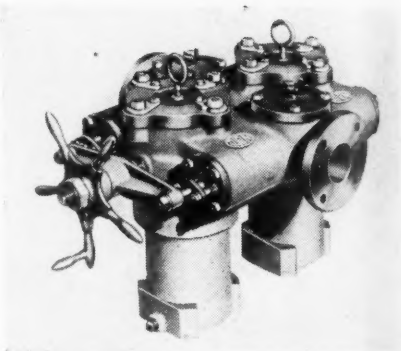


are several times larger than those used previously. Fluid lubrication and a built-in forced feed pump having no parts to wear are said to assure an adequate supply of lubricant to all bearings regardless of operation position.

•

Pipeline Strainer

A duplex vertical chamber disk-type pipeline strainer designed to assure continuous flow in pipelines is offered by J. A. Zurn Mfg. Co., Erie, Pa. It is operated by a large handwheel that reverses valves simul-



taneously with minimum pressure drop. Capacity flow, it is said, is assured at all positions of the operating handwheel. Another unusual aspect is the eccentric position of the strainer basket with respect to the basket chamber so that the flow section is proportional to the flow needs at all points, thus minimizing pressure drop.

Made in cast bronze, steel, semi-steel and cast iron with the basket of perforated brass, Monel or other specified metals, this unit is said to protect all types of pumps, traps, valves, regulators, aspirators, injectors, control units and other primary equipment.

•

Fluorescent Lamps

Fluorescent lamps that furnish a new and warmer-appearing daylight color, known as "4500 deg. white," soon will be in production by the Westinghouse Lamp Division, Bloomfield, N. J. Made possible by developing a new formula for making and mixing the phosphor crystals that produce the regular daylight and white light, the new color is described as about midway in color quality and light output between the present standard white fluorescent lamp and the daylight lamp. Initially the new color will be offered in only 40- and 100-watt sizes.

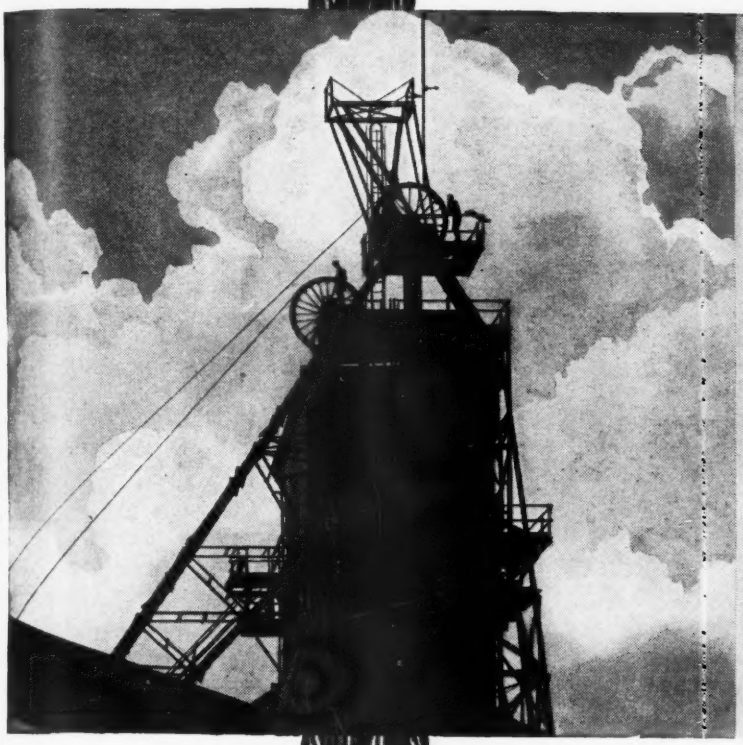
•

Heavy-Duty Shovel

Marion Steam Shovel Co., Marion, Ohio, has added to its line the Type 151-M shovel, designed for heavy digging. It carries a 6-cu.yd. dipper with a standard front end of a 5-cu.yd. dipper with a long-range front end. It is convertible to a dragline machine and dragline sizes vary from $3\frac{1}{2}$ to 7 cu.yd., depending on boom lengths, which range from 80 to 120 ft.

Incorporated in the 151-M is the latest

J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE



J&L
PERMASET PRE-FORMED
WIRE
LINES

Precisionbilt to suit the job — stay on the job. Shaft ropes . . . feed ropes . . . conveyor ropes . . . drag lines — right through the catalog of wire rope for mining — you will find the J&L rope to suit the job and stay on it. For J&L Wire Rope is Precisionbilt from J&L Controlled Quality Steel . . . by men of skill and experience . . . on machines of extreme accuracy. For extra service . . . extra long life . . . J&L Permaset Pre-formed pays extra dividends on your equipment investment.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

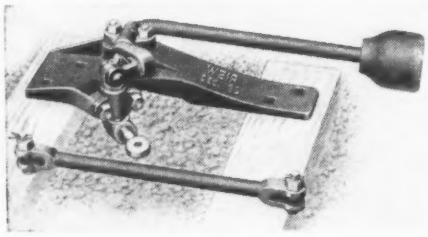
GILMORE WIRE ROPE DIVISION

PITTSBURGH 30, AND MUNCY, PENNSYLVANIA

J&L PERMASET PRECISIONBILT PRE-FORMED WIRE ROPE

SWITCH STANDS that CONSISTENTLY *Prove Their Value* in moving MORE COAL...FASTER

WEIR KILBY



Design 25—Parallel Throw

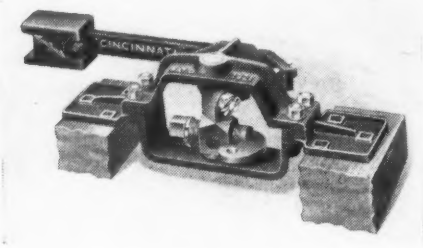
Design 25—An improved Parallel Throw Stand of simple construction and easy operation. The stand is low to give maximum clearance; parts are interchangeable and easily replaced. Adjusting arm permits easy change of throw from 3" to 5".

CHAMPION—Self-locking and non-automatic. The throw is adjustable by means of transferable shims which allow a variation of ⅛" and a range of 1".

Open Type Spring Rod

Enclosed Type Spring Rod

These switch stands furnished with either solid or spring connecting rods.



CHAMPION Parallel Throw

CATALOG "H" comprises 154 pages of helpful data, replete with photos, drawings and specifications, covers every track work need. A request on your letterhead will bring your copy promptly.

Suppliers to Mines and Railroads Since 1882

WEIR KILBY CORPORATION

CINCINNATI 12, O. BIRMINGHAM 7, ALA.

DRY SAND

will get more coal out faster!

...as produced by PERFECTION CONE STOVE DRIERS

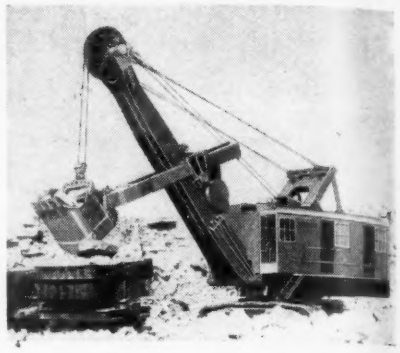
Spinning wheels won't pull heavy loads. It takes sand . . . *dry sand* . . . running freely from locomotive to track to give hard-driving wheels traction and real pulling power!

Get dry sand at HALF the usual cost! Use the "PERFECTION" Cone Stove Sand Drier. Standard size dries 8 to 10 tons in 8 hours . . . capacity can be increased to 12 to 14 tons. Write for full particulars.

Remember "PERFECTION" it's the best!

PRINCETON

Foundry & Supply Co. Princeton, W. Va.



type of high-speed electrical control—the "Amplidyne" or "Rototrol" Ward Leonard system—on all motions, which is said to provide great speed and accurate and delicate control over all motions.

•

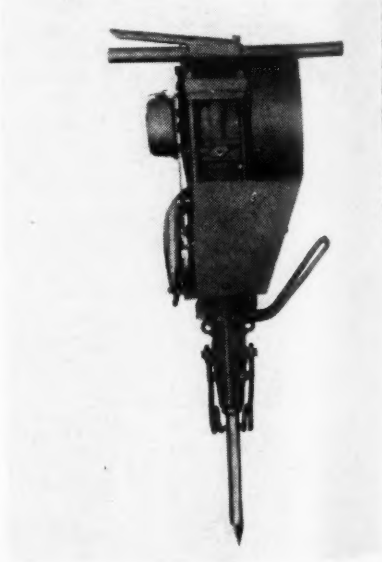
Grease for Motors

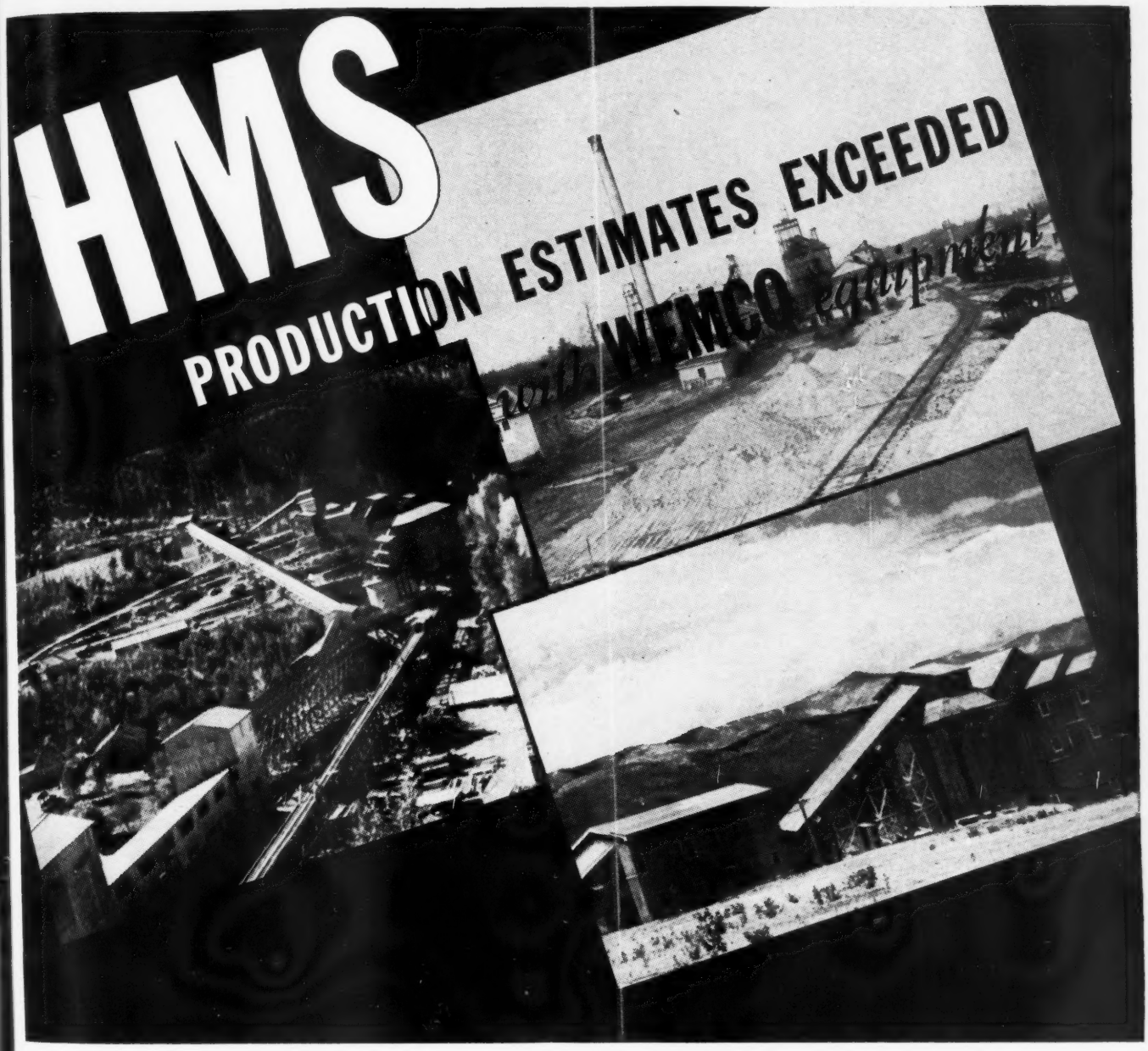
For dependable lubrication from 13 to 176 deg. F. for all speeds up to 3,600 r.p.m. for horizontal or vertical operation, an improved grease for ball- and roller-bearing motors is offered by the Westinghouse Electric Corp., East Pittsburgh, Pa. Available in a new 8-oz. nasal-type tube, the grease is said to be stable, highly resistant to oxidation and to remain in a bearing for an indefinite period without drying out, caking or separating. Designed for easy and economical use, the new tube has a large opening in the long nasal spout that fits into a ⅛-in. pipe coupling, and a key with which to wind and exert pressure from the bottom of the tube.

•

Paving Breaker

Syntron Co., 975 Lexington Ave., Homer City, Pa., announces an improvement in the design of the tool-retaining arrangement of its self-contained portable gasoline hammer paving breaker. The nose-end arrangement has been redesigned to utilize the resiliency of a spring-tool retaining clip, as illustrated. This eliminates the solid-latch mechanism previously employed and commonly used in this type of demolition





Employment of Wemco equipment, designed and constructed especially for HMS, increases milling profits on any property where application of Heavy Media Separation processes is judged practical.

Pictured on this page are three plants using Wemco HMS equipment. In each of these plants—Rosiclare Lead and Fluorspar Company, Ore and Chemical Corporation and Northwest Magnesite Company—production exceeded original estimates. This is a concrete illustration of the efficiency resulting from Wemco's study of HMS processes and experience in designing and building equipment for more HMS installations than any other manufacturer.

Because of its background of HMS experience, Western Machinery Company is fully prepared to supply equipment tailored to the needs of your job.

1010

HMS *equipment by Wemco:*

- SEPARATORY SCREWS
- SEPARATORY CONES
- DENSIFIERS
- SPECIAL THICKENERS
- MAGNETIZING BLOCKS
- SOLENOID GATES
- GLANDLESS SAND PUMPS
- SPECIAL MEDIA SEPARATING HOPPERS
- 20" HMS LABORATORY UNIT

WEMCO

WESTERN MACHINERY COMPANY

760 FOLSOM STREET, SAN FRANCISCO 7, CALIFORNIA

LOS ANGELES • SACHAMENTO • SPOKANE • SALT LAKE CITY • PHOENIX • DENVER • NEW YORK • WASHINGTON, D.C.

AGITATORS • SAND AND DIAPHRAGM PUMPS • FEEDERS • CLASSIFIERS
HYDROSEPARATORS • THICKENERS • TABLES • H M S EQUIPMENT

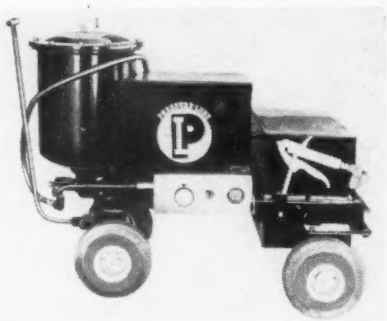
hammer for retaining the tool in the hammer.

Three advantages are claimed for the resilient spring clip arrangement: (1) providing easy spring action of the tool itself when used at maximum overtravel; (2) providing a quicker and easier method of changing tools used in the hammer; (3) the elimination of broken retainer latches, nose castings, etc., because of lack of resiliency in the retaining arrangement.

•

Portable Greasing Unit

Equipment with a grease gun for every lubrication purpose, with battery-powered or gasoline-driven motor, is offered by Pressurelube, Inc., 609 West 134th St., New York 31. Flexible, economical operation is assured by its complete portability—no electric cord or air hose is required. Unit is said to deliver up to 12,000 lb. steady, consistent pressure that is instantly available to clear the most obstinate channel stoppages and effect complete lubrication of parts. Complete portability provides on-the-spot lubrication—trucks, trailers, tractors, power shovels, rolling stock of all descriptions may be serviced on the job without removing load.



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Electric Marker

A new electric marker said to be exceptionally light in weight and to operate at high speed is offered by the Breuer Electric Mfg. Co., 5098 Ravenswood Ave., Chicago 40. Six inches long and weighing only 8 oz., the marker operates at 7,200 strokes per minute, cutting fine deeply embedded

PROTECTION

when and where

NEEDED MOST

Each Hodgman garment is designed for a specific use or occupation to stand up under the most severe service conditions. All fabrics, coated in our own plant, meet the most rigid government specifications. All Hodgman garments are reinforced in the proper places, are waterproof and provide the utmost in comfort. There is a Hodgman garment for almost every industrial use.

PROTECTIVE CLOTHING

Address Dept. C-1 — *for latest Catalogue*

HODGMAN RUBBER CO.

Framingham, Mass.

New York 6, 261 Fifth Ave. | Chicago 2, 173 W. Madison | San Francisco 5, 121 Second

The one thing that sustains a diver is air—and, they make sure that he gets a proper supply all of the time he is under water.

It's a similar situation underground at the working face—clean, pure air is needed at all times—and your job is to get it there.

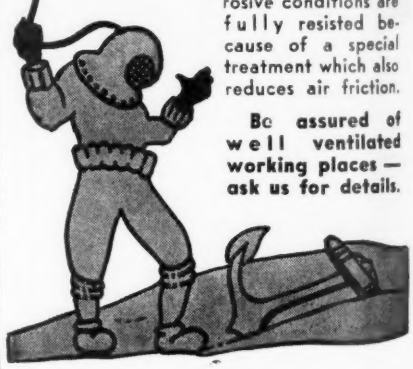
ABC

JUTE BRATTICE CLOTH

• Resists the effects of moisture, won't shrink, therefore no air leakage.

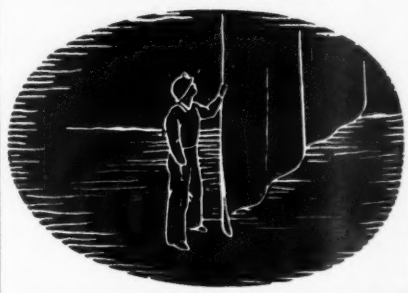
ABC Jute Brattice Cloth resists fungi because of a compound which is formed by the chemicals used. A chemical treatment also is given this cloth so that it is flame resistant. Corrosive conditions are fully resisted because of a special treatment which also reduces air friction.

Be assured of well ventilated working places — ask us for details.



Invest in Victory

BUY VICTORY BONDS



AMERICAN

BRATTICE CLOTH CORP.

WARSAW - INDIANA

Cutting teeth for a helical gear in one of the precision hobbing machines.

We cut our teeth!

To bring you the finest in crawler tractors . . . to assure efficient, economical operation, all gears and spline shafts for Oliver "Cletrac" tractors are cut in our own plant. In this way, we can guarantee the close tolerances . . . the precision fits so necessary for smooth, quiet operation and freedom from excessive maintenance.

Cutting our own gears is but one extra step we take to assure the *extra* quality that is inherent in every Oliver "Cletrac" tractor part. Materials, workmanship and equipment are all based on one standard . . . the built-in quality that means added years of service.

Maintenance of that standard enables your Oliver "Cletrac" dealer to offer you the finest in crawler tractors . . . for your every need.

CLETRAC

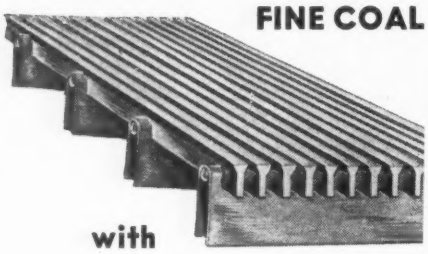
THE OLIVER CORPORATION Cletrac

a product of

The OLIVER Corporation

INCREASE
PRODUCTION
LOWER
MAINTENANCE

SIZING and DEWATERING
FINE COAL



with

The Profile-Bar

WEDGE-BAR
SCREEN

with

Continuous Slot Openings
Enlarging Downward

WEDGE-BAR means continuous slots. No cross wires, loops or non - perforated areas. Downward enlarging slots draw moisture and undersize from screen surface. U - Holder supports mean maximum carrying capacity and rigidity, minimum weight.

WEDGE - BAR Sections are specially designed and fabricated to do your job and fit your equipment for the most efficient screen performance and longest life. Our data sheets are available for your convenience in supplying data we need to make our recommendations — without obligation on y o u r part. Write us.

Shaker Jackets • Vibrating Screen Panels • Chutes • Conveyors • Dryers

WEDGE-BAR SCREEN CO.
145 Hudson St., New York 13, N. Y.

dots into materials or tools, leaving a permanent identification. Barrel of marker is gripped like a pencil and writes on the same principle. Entire unit is self-contained, ready to use, including hardened alloy point as standard, or can be provided with diamond point for cutting extra hard surfaces.

•

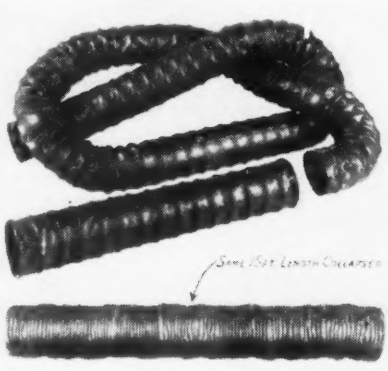
Aluminum Wheels

Northrop Gains, Inc., 1985 East 16th St., Los Angeles, offers industrial wheels cast solidly of aluminum and with hard rubber tires molded on firmly. Built in 6-, 8-, 10- and 12-in. diameters, the wheels are designed for use on hand trucks, dollies and all rollable industrial equipment. Although they weigh as little as 3 lb., these wheels are said to be built to carry 40 percent more weight than other units of equivalent size and are equipped with Timken tapered bearings requiring no lubrication during the life of the wheel.

•

Ventilating Hose

"Portovent," a new type of ventilating hose, is offered by the American Ventilating Hose Co., 15 Park Row, New York City, to supplement its more rigid spiral wire reinforced "Flexaust" and non-reinforced "Bloflex." It is reported by the maker to be designed to meet needs for metal-reinforced lightweight large-diameter ducts that can be compressed into small space for transportation, and yet stay around sharp bends.



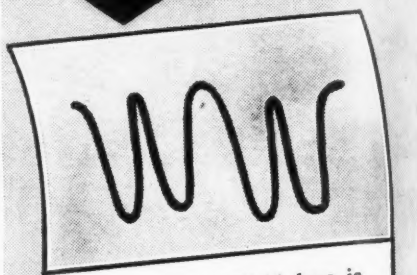
A special feature is its sectional construction, allowing the assembly of any desired length from 2½-ft. sections that are stated to be readily coupled and uncoupled with only the hands and yet form a tight joint that will not be broken by jerks or pulls encountered in service. Special attachments for coupling to blowers or other air-handling apparatus are provided, and these fittings couple interchangeably with either end of any section.

•

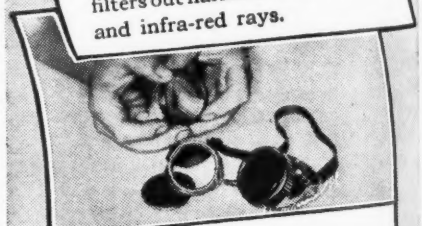
Soldering Irons

A new and improved line of industrial soldering irons is offered by the industrial heating division of General Electric Co., Schenectady, N. Y. Ranging from 75 to 300 watts in size and available with tips

Get This Assurance of Welding Eye Protection



Every Willson-Weld lens is marked like this. Purpose: to show that it meets highest Federal specifications. Reduces intensity of visible light, filters out harmful ultra-violet and infra-red rays.



Clear cover lenses to protect green Willson-Weld lenses from pitting. Both lenses easily replaceable. Welding goggles fit comfortably over ordinary correction spectacles.

Style CW-60

Shade number — determined by individual photometer test —indicates density and thickness of each lens. Simplifies selection. Lenses easily interchanged for different types of welding.

For help with your welding eye-protection problems, consult your Willson distributor or write for further information.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON
PRODUCTS INCORPORATED
Established 1870

239 WASHINGTON STREET • READING, PA., U.S.A.

SOON

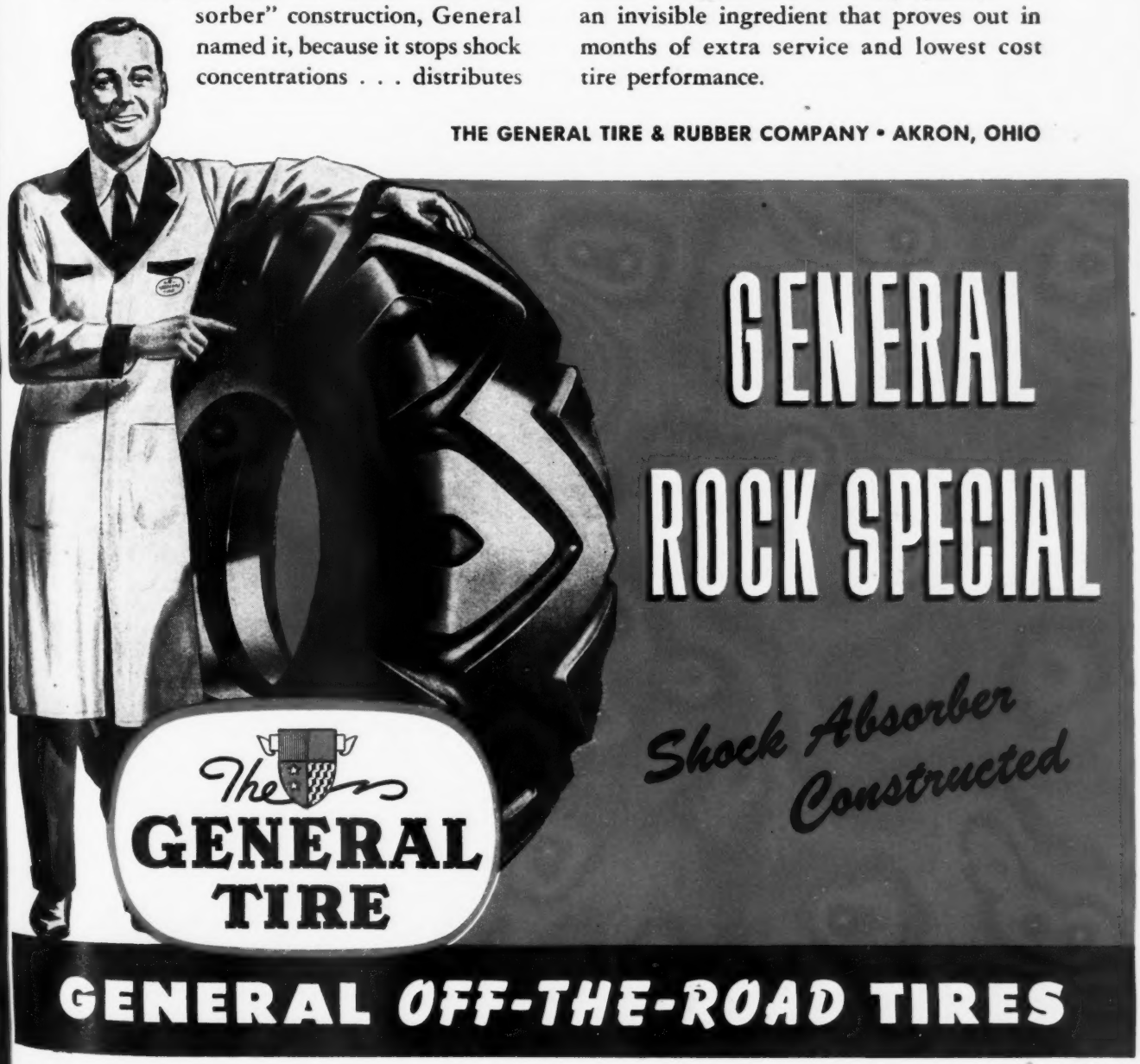
The toughest Rock Special of all Times!

● The General Rock Special is soon to be 100% virgin rubber again . . . and built to the toughest, heavy duty standards known.

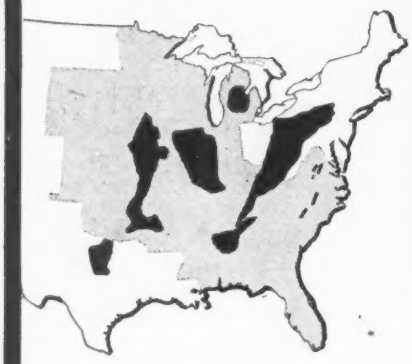
Building synthetic rubber tires to do the same jobs as natural rubber tires during the war, developed and *proved* a new method of tire engineering at General. "Shock Absorber" construction, General named it, because it stops shock concentrations . . . distributes the loads and stresses uniformly . . . preserves the tire carcass under the hardest service conditions.

But General's coming Rock Special is more than just an engineered all-rubber tire. It will give you . . . as always . . . General's special kind of Top-Quality . . . an invisible ingredient that proves out in months of extra service and lowest cost tire performance.

THE GENERAL TIRE & RUBBER COMPANY • AKRON, OHIO



SERVING Mine Operators



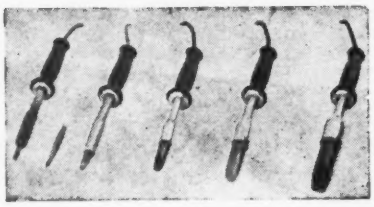
Majority of U. S. Coal Deposits

Where Workmen's Compensation insurance is available through Bituminous Casualty Corporation.

MAJOR coal fields rely on the Bituminous Safety Engineers to help keep mine accidents at a minimum through practical, common sense suggestions. Years of experience have earned for these men the reputation of being leaders in this work.

BITUMINOUS CASUALTY CORPORATION
ROCK ISLAND ILLINOIS

28 years of service to the industry



from ⅜ to 1¼ in. in diameter, the new irons are designed primarily for severe and exacting soldering operations in industrial plants.

An important feature of these irons is their quick recovery and high reserve-heat capacity, which permit soldering as fast and continuously as the character of the work allows. Another feature is the use in these irons of calorized (surface-alloyed with aluminum) copper and 18-8 stainless steel for all parts subject to high temperatures. This, together with the use of the Calrod heating unit, is said to assure long life, uniform performance, low maintenance and to allow convenient renewal.

•

Crane

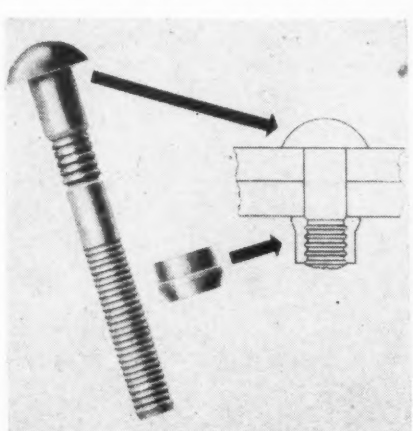
Hughes-Keenan Co., 649 Newman St., Mansfield, Ohio, offers a powerful new roustabout crane, Model MC-8, that handles loads up to ten tons. Said to be a mobile full-swing boom crane, tractor-mounted, easily driven where needed and especially adapted to use of long booms, it is furnished with booms of standard lengths from 15 to 30 ft. and will handle loads of nearly two tons at 30-ft. radius; 10 tons at 9 ft. Boom swing and hoist and load hoist are all independent actions with separate controls and automatic brakes. Designed for easy, efficient operation, it is suitable for loading, unloading, moving or stacking heavy, bulky objects, especially outside the range of big overhead cranes or where none is available.

•

Fastener

Known as the Huck lockbolt, a new type of fastener is offered by the Huck Mfg. Co., Detroit. The lockbolt first draws the work tightly together in the equivalent of a bolting-up operation, fills the hole completely when required, then is rigidly and permanently locked in place like a rivet.

The new fastener consists of two precision parts: (1) a pin, which has a head of any desired type, locking grooves, a



WHICH BITS

DRILL MORE BLAST HOLES?

Only part of the answer lies in the fact that hard-faced bits deliver more footage than uncoated steel bits. It's also important to know which brand of hard-facing wears longer.

To settle this point, one mine compared the performance of a Coast Metals Hard-Faced bit, marked "A" above, with that of two competitive bits, marked "B". Results proved that both "B" bits were out-performed by the Coast Metals Hard-Faced units on several counts. "A" bit showed less wear, needed less changing and hence fewer man-hours to operate, used less motor power in cutting, and cut faster.

Similar savings in resisting wear and abrasion are obtained with Coast Metals Hard-Facing in a host of other coal mining applications. Write for details.

COAST METALS, INC.
Plant and General Offices:
1232 Camden Ave., S.W. Canton 6, Ohio
Executive Offices:
2 West 45th Street, New York 19, N. Y.

COAST METALS
hard-facing weld rods
MAKE YOUR EQUIPMENT LAST LONGER

O.K. of a Great Critic...

A WHOLE PLANTFUL OF THEM WHO BUILD MOTORS TO SATISFY EXACTING BUYERS!

Other plants may turn out *more* motors than the Star Plant. But you'll find no *better* motors . . . for when you see the Star Trademark you see the "O.K." on the efforts of hundreds of meticulous craftsmen working to critical standards.

Among them are the men who own the company. For Star's owners are born motor men, and the place to find them is out in the plant or around a drawing board, helping to make Star Motors as good as they can be.

Everybody at Star is exacting about quality . . . in design, materials, workmanship. There's a craftsman's spirit everywhere that words can't cover. But motor buyers who visit us always comment on it. And exacting motor users recognize that Star does things a bit better by specifying Star where a motor must be better than "good enough".

WRITE FOR 8-PAGE DIGEST. It outlines Star Motors (⅛ to 200 HP) and Generators (to 150 KW) . . . names hard-to-satisfy buyers who are long-time customers . . . tells how Star becomes the "Motor Department" for customers. Star Electric Motor Co., 234 Bloomfield Ave., Bloomfield, New Jersey.

STAR MOTORS

POWER PACKAGED AS YOU NEED IT

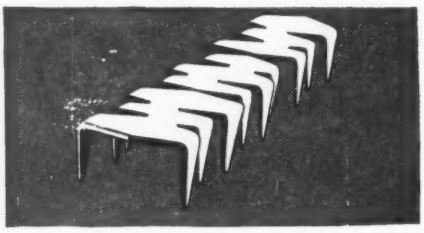
CONVEYOR BELTS

fastened or repaired

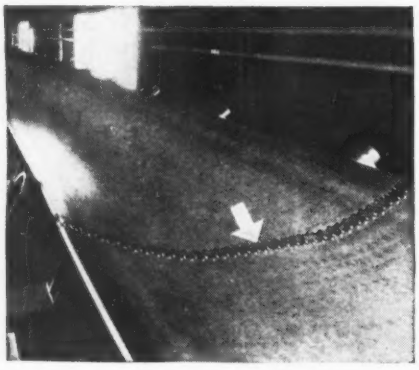
ON THE JOB

in a few minutes

All you need are hammer, block of wood and . . . .



BRISTOL'S BELT LACING



For rubber or woven conveyor belts up to $\frac{13}{16}$" thick.
Write for Bulletin 736.

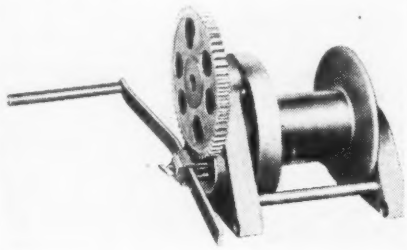
THE BRISTOL COMPANY
Mill Supply Division
139 Bristol Road, Waterbury 91, Conn.
DISTRIBUTORS EVERYWHERE

breakneck groove, and pull grooves that fit the jaws of the driving gun; and (2) a locking collar. The pin is inserted from the back side of the work, the collar is slipped onto the pin and the gun is applied. In rapid succession the gun squeezes the work together between the collar and the head of the pin; wire-draws the pin to a press fit in the hole when hole filling is required; swages the collar into the locking grooves in the pin; breaks the pin off flush with the collar, and frees itself from the swaged collar. Both hand-operated and pneumatic guns are available.

•

Winch

American Hoist & Derrick Co., St. Paul 1, offers the "Handiwinch," a hand-powered unit of all-steel construction that, though weighing only 95 lb., is said to be



able to handle a 10,000-lb. load. Measuring 16½x15½x16¾ in. high, it has oil holes provided for the drum, otherwise self-lubricating bronze bushings throughout.

•

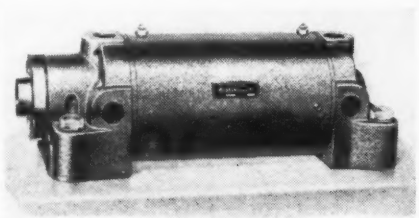
Drill

Salem Tool Co., Salem, Ohio, offers a new horizontal earth boring machine known as the McCarthy drill, designed by a strip-mine driller. The hydraulic unit feeds the augers, eliminating manual feeding and making fast drilling possible. The operator, it is said, can raise the machine as much as 4 ft. from the ground or truck bed with the new type jacks. The unit weighs 3,500 lb. and can be furnished in truck-mounted, trailer-mounted or self-propelled type. In a short time a vertical type is to be introduced.

•

Hydraulic Cylinders

Maximum power without leakage and lasting accuracy of bore dimensions are said to result from the centrifugal-cast barrels and other advanced features of the new improved Logan "Rotocast" hydraulic cylinders offered by the Logansport Machine Co., Inc., Logansport, Ind. Through

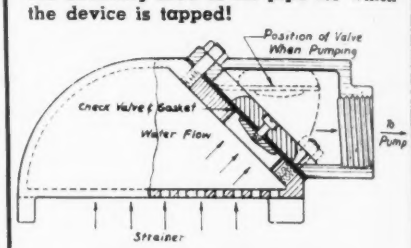


G.M.C. COMBINATION FOOT-VALVE STRAINER

for Mine

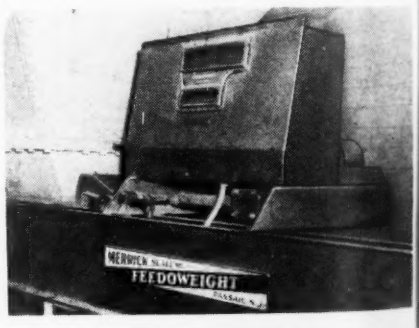
Gathering Pumps

A device that answers a long-felt need . . . a combination foot-valve and strainer that has approximately double the straining area of the pipe for which the device is tapped!



Write for details today!

Guyan Machinery Co.
Logan, West Virginia



THE MERRICK

FEEDOWEIGHT

Reg. U. S. Pat. Off.

tells rate per hour —weight per day

A self-contained automatic conveyor scale, combined with automatic gate to give feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Feed rate may be varied. Large feed opening insures even flow. Uniformly feeds bulk material BY WEIGHT; and automatically totalizes weight of materials fed. Durable. Simple to operate. Rugged, heavy duty design. Slow moving parts mean long life. Easy to install and maintain.

we also manufacture

The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveying operation. Complete descriptive matter on request.

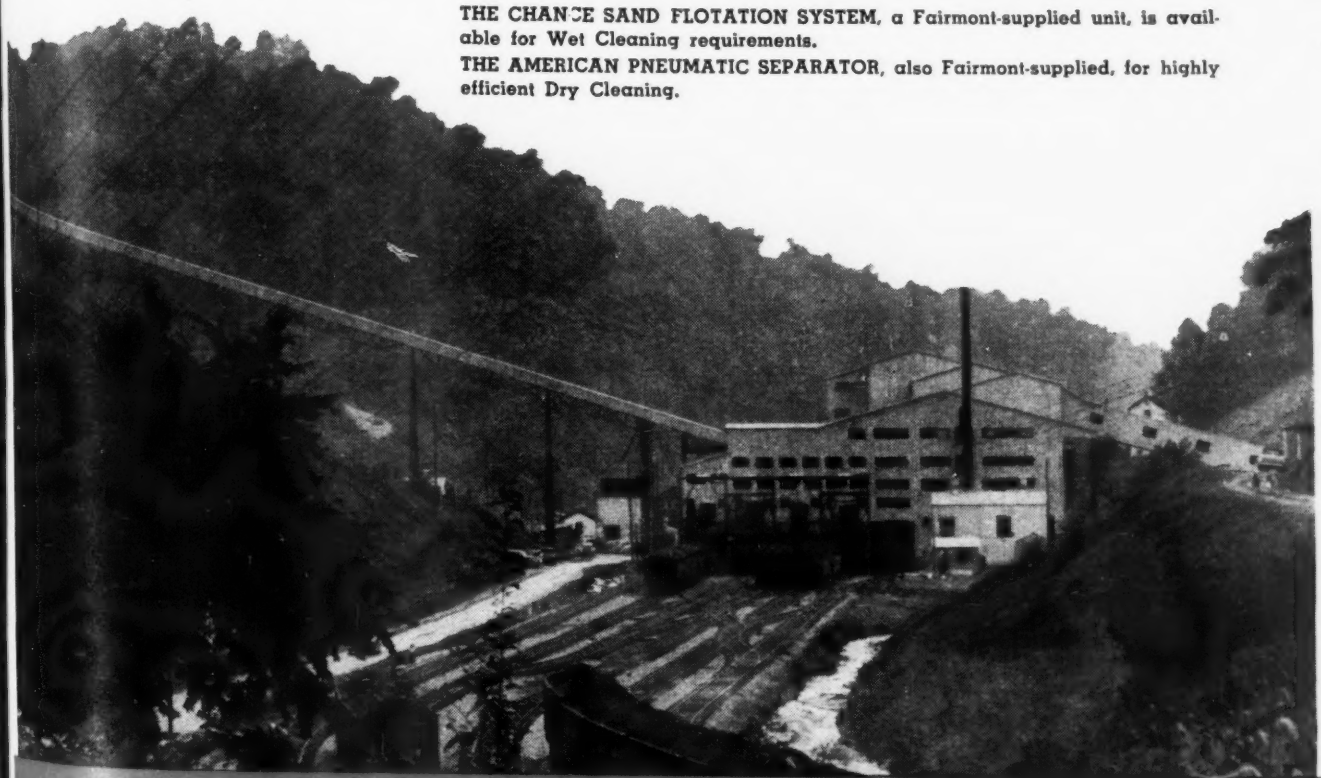
MERRICK SCALE MFG. CO.
Engineers & Mfgrs. of Automatic Weighing Equipment
PASSAIC, N. J., U. S. A.

HOW WOULD YOU LIKE THREE TIMES AS MANY BUYERS FOR YOUR COAL?

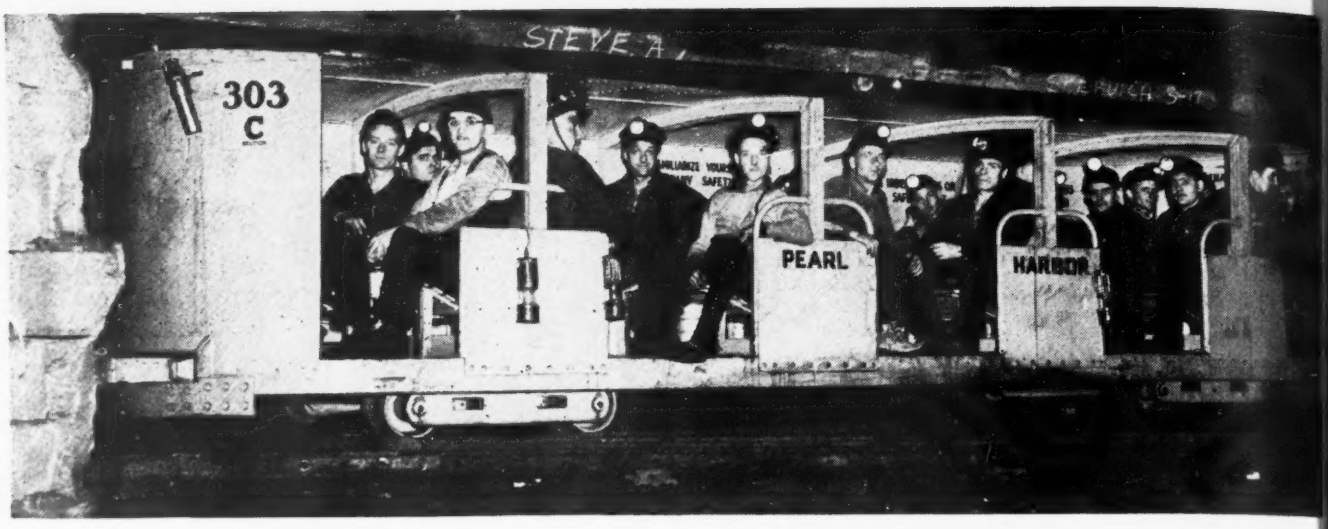
You *can* increase your market . . . add new customers and gain new profits, by concentrating on preparation of your coal . . . for it is specification fuel that is attracting buyers in the premium price markets! They're looking for coal that is low in impurities, high in BTU value, uniform in quality—and you can supply coal to meet those qualifications by arranging with FAIRMONT *now* to rejuvenate your present preparation methods—or to design and install complete new preparation systems.

FAIRMONT Engineers are ready to discuss with you methods of handling and treatment that will increase the market possibilities of your coal. FAIRMONT supplies and installs Chance Sand Flotation System for Wet Cleaning and the American Pneumatic Separator for Dry Cleaning. Full particulars on both systems will be sent on request. Write to FAIRMONT MACHINERY COMPANY, Fairmont, West Virginia.

THE CHANCE SAND FLOTATION SYSTEM, a Fairmont-supplied unit, is available for Wet Cleaning requirements.
THE AMERICAN PNEUMATIC SEPARATOR, also Fairmont-supplied, for highly efficient Dry Cleaning.

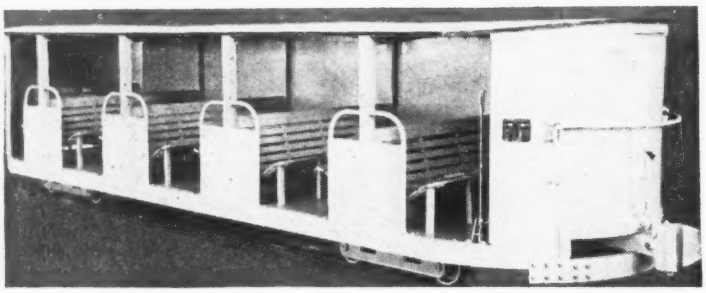


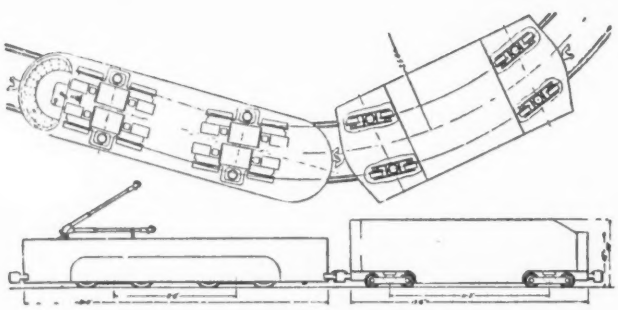
TRADE MARK REGISTERED
FAIRMONT MACHINERY COMPANY



DIFFERENTIAL MAN-TRIP CARS

for fast, safe, low cost transporation





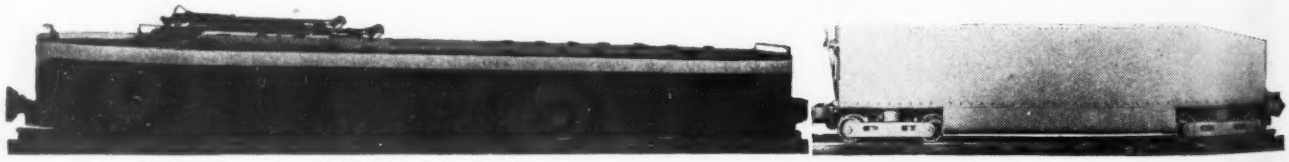
Differential 360 horsepower 8-Wheel AXLESS Locomotives and 10-ton 8-Wheel AXLESS Mine Cars increase mining capacity, and reduce mining costs. Provide more adhesion for tractive effort and braking . . . pull longer trains at higher speeds with greater safety . . . haul greater loads with less punishment to track . . . use less electric current per ton hauled

• This sturdy Man-trip car with Differential 8-Wheel AXLESS Trucks meets the need for safe, rapid transportation of men to and from working places underground.

It provides a comfortable, clean, dry ride for the men. The car is 22 feet long—seats 38 men—can negotiate a 30 foot radius curve.

Steel construction is used throughout with wood top over the metal roof as a protection in event trolley wire is encountered. Both ends and trolley wire side are fully enclosed. This prevents men from getting out on the wire side and avoids costly accidents. This also protects men from roof falls, rock dust, water, and shields them from cold intake air in winter.

These Man-trip Cars with Differential AXLESS 8-Wheel Trucks provide faster transportation with safety, getting the men to the working place quicker—and in comfort.



DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO, U. S. A.

Builders of Haulage Equipment Since 1915

AIR DUMP CARS · MINE CARS · MINE LOCOMOTIVES · ROCK LARRIES · DUMPING DEVICES
BURDEN-BEARING LOCOMOTIVES · STOCKPILING CARS · COMPLETE HAULAGE SYSTEMS

ST. LOUIS SNAPSHOTS

HE GETS
ALL THE BREAKS...
HE HAS A ROOM
AT THE HOTEL

Mayfair
EIGHTH AND ST. CHARLES

efficient use of smooth-operating hydraulic power they are designed for a wide range of operations involving pushing, clamping, lifting, forcing, holding, pulling, pressing and other power movements in any direction.

These units are offered in seven mounting types, three piston-rod models and nine standard bores. They are available with cushioning at one or both ends if desired. Although designed primarily for oil service, they may be used for water service if the water is treated; if untreated water must be used, cylinders of special material can be supplied. These cylinders are built for operating pressures to 1,500 p.s.i.

•

Load Lifter

A cam-lever mechanism and chain that grabs up heavily laden steel barrels, steel plate, etc., and holds them in a vise-like grip that grows tighter the heavier the load is offered by the Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2, the device to be known as "Granny Grip." The standard unit consists of two stamped alloy steel bodies (cam lever mechanism) and Herc alloy chain. Particularly designed to facilitate handling of materials with industrial trucks and cranes, it is quickly installed and lets go immediately the load is put down.

•

Tax Chart

A simplified witholding tax chart offered by Delbridge Calculating Systems, Inc., 2502-10 Sutton Ave., St. Louis 17, is said to meet all of the requirements of the new income tax law.

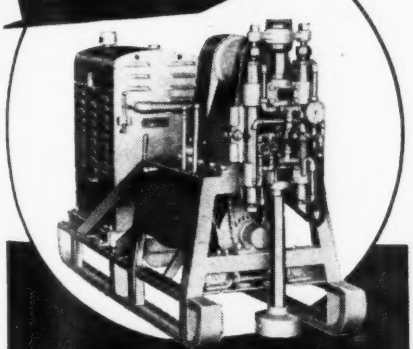
Scientifically designed to insure accuracy and save time in making withholding tax deductions, this chart is printed in large type and thoroughly covers every detail of withholding requirements. Published in four editions, it covers weekly, bi-weekly, semi-monthly and monthly payroll periods.

•

Air and Gas Cleaner

Aerotec Co., 61 West Chester Ave., White Plains, N. Y., offers Aerotec—trade name of a new type air cleaning tube used in multiples up to any desired capacity, said to have exceptionally high precipitating efficiency and developing no pressure build-up, clean air being exhausted from

Diamond Core Drilling
CONTRACTORS

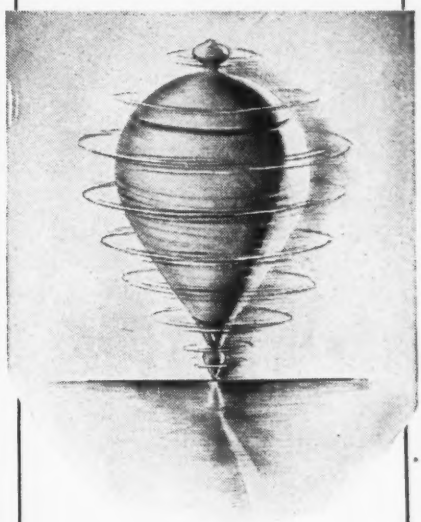


Testing mineral properties with our light gasoline drills. SATISFACTORY COAL CORES GUARANTEED. Ground solidification by our pre-pressure grouting method for shafts. We mine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

The "C·M·I" CONTINUOUS CENTRIFUGAL

This dryer reduces the moisture content of the finer coal sizes to a point where there is no clogging of spouts, cars, bins, etc., also no freezing in transit or storage.



At many plants this machine is also reclaiming sludge and slurry coal and making a product that is sold for use in powdered coal plants, on chain grate stokers or blended back with some of the larger sizes. Much good carbon that had previously been thrown away is now made into a saleable product.

CENTRIFUGAL AND MECHANICAL INDUSTRIES INC.
3600 SOUTH SECOND STREET
ST. LOUIS 18, MO.

PROFIT Boosters

Improved electrical protection reduces mining costs, increases both quality and quantity of production

Sectionalizing Reduces Lost Time

Type KSC automatic reclosing circuit breakers limit trolley and feeder disturbances to the areas in which they originate and prevent distant stations from feeding into a faulted section. Voltage conditions are improved. Maintenance of electrical equipment is reduced, production time losses are kept at a minimum and fire hazards are minimized.

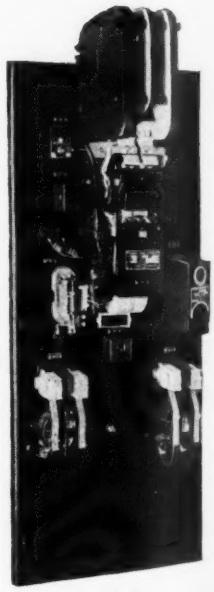
Complete steel enclosure protects KSC mechanism, means quick installation and easy relocation.

"KSA" Keeps Power Flowing

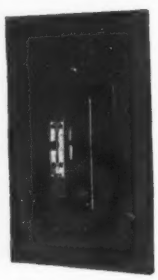
Type KSA automatic reclosing circuit breaker reduces the duration of outages caused by overload peaks and faults on trolley systems. It opens the circuit when necessary and restores service automatically as soon as line conditions permit. Ability to measure line conditions is inherent in the device.

Since action is automatic, requiring no operator, smaller generating units located nearer load centers may be employed. This further improves voltage conditions and reduces cause of outages.

Illustrated is Type KSA for feeder-generator application. It incorporates two means of measuring line conditions (1) measuring the load and (2) measuring voltage difference.



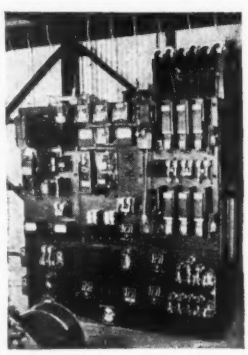
"Distributors" Equalize the Load



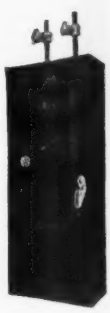
Type LDR Load Distributors make a direct contribution to peak tonnage in mechanized mines by avoiding frequent opening of circuit breakers, particularly those outages arising from unequal distribution of load among widely separated substations operating in parallel. Loads on either M-G sets or rotary converters are kept in balance by automatic transfer under peak conditions. Not only is overheating with resulting outages reduced but necessity of maintenance is greatly lessened.

Full-Automatic Switchboards Improve Operations

Meeting all electrical emergencies in mechanized mines, I-T-E automatic controls protect lines and equipment against a-c overload, converter field failure, phasing faults, incomplete start, low a-c voltage with automatic restart, reverse current or polarity conditions, d-c short circuit and overload. Operate without attendance.



Distant Trolley Circuits Protected



Type ETB Trolley Wire Protector is used to prevent needless damage from high-resistance "shorts" on trolley feeders in remote and rarely frequented sections of the mine. It is a circuit breaker whose operating characteristics are properly related to the heating characteristics of 4/0 copper wire. This Protector is insurance against costly fire hazards and prevents needless penalizing of electrical service elsewhere.

Send for Catalog 2503 which fully describes and illustrates these equipments

I-T-E CIRCUIT BREAKER CO.

Representatives in Principal Mining Areas

PHILADELPHIA 30, PA.

QUALITY PACKING

MARLO

METALLIC & SEMI-METALLIC

PACKING

for

MINE PUMPS

"The Packing that gets the Repeat Orders"

For deep mine pumps. Resists acid mine waters. Keeps grit out of stuffing box. Three types.

• MARLO ALL PURPOSE METALLIC PACKING

Best ever devised. Will not freeze at 70° below, soft, pliant, like fibrous types, yet easier to handle. Won't cut, score or corrode moving parts.

• "TWIN-TWIST" SEMI-METALLIC PACKING

Metal strands twisted with asbestos. Anti-frictional. Durable. Economical. Remarkable compressibility. Never hardens. For temperature up to 550° F.

• "RED WATER" SEMI-METALLIC PACKING

Most modern development for all hydraulic applications. A solid - packing vegetable fibre combined with metal strands. Retains form under any conditions.

Let us serve you

THE MARLO COMPANY

38 HOWARD ST.

NEW YORK, N. Y., U. S. A.

3-in-1

BLOW — CLEAN — SPRAY with TORNADO

With its 1 h.p. G. E. motor, TORNADO Portable Electric Blower blows dust, dirt and lint out of motors, generators, shafting, etc. With bag and attachments added, it is convertible into a Vacuum Cleaner, for cleaning shelves, bins, floors and light salvaging. With other attachments, it can be made into a Sprayer, for spraying insecticides. Keeps equipment and plant clean for faster production and lower costs. Saves power—reduces hazards—lowers upkeep.

Request details and FREE TRIAL Offer

BREUER ELECTRIC MFG. CO.

5098 Ravenswood Ave., Chicago 40

TAKE THE DUST OUT OF DUST BY TORNADO

TORNADO PORTABLE ELECTRIC BLOWER

the central tube while the dust is precipitated from the bottom.

It is recommended for reclaiming valuable powders; intakes on diesel and gas engines; cleaning dangerous dust-laden air in industrial plants; and other applications requiring high collection efficiency. Single tube has a capacity of 30 c.f.m. at 4 in. w.g. resistance.

•

Industrial Notes

SYNTRON Co., Homer City, Pa., has appointed J. A. Armstrong as district manager of sales and engineering service on vibratory material-handling equipment, portable electric tools and self-contained gasoline hammers for Michigan outside of Detroit, with headquarters in Lansing.

FAIRBANKS, MORSE & Co., Chicago has elected Charles H. Morse 3d as vice president. He will be in charge of research patents, traffic, the company's western pump division, and the Inland Utilities Co., F.-M. subsidiary with properties in 41 cities and towns in Colorado, Kansas and New Mexico. His headquarters will be in Chicago.

CLARK MFG. Co., Cleveland, manufacturer of steam specialties, has appointed Charles W. Stewart as vice president in charge of sales. For the last 19 years he has been associated with the Hoffman Specialty Co., Indianapolis, as zone manager, assistant general sales manager and, more recently, as vice president in charge of sales. He also has served as president of the Steam Heating Equipment Manufacturers' Association since 1942.

MANNING, MAXWELL & MOORE, INC., announces that its new plant for the manufacture of Hancock products, being built at Watertown (suburb of Boston), Mass., will be ready for occupancy soon after the first of the new year. As soon as the executive offices are completed at the new plant, the sales department for these products will be moved from Bridgeport, Conn., to Watertown, with M. S. Palmer as department manager.

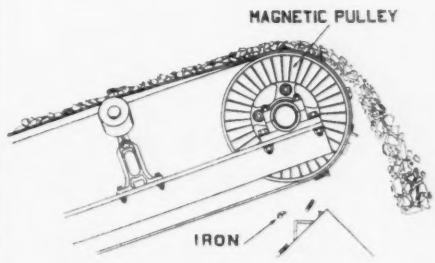
MACK-INTERNATIONAL MOTOR TRUCK CORP. has appointed Lt. Col. H. P. Valentine as manager of dealer sales and operations with headquarters in the Empire State Building, New York City. Prior to his service in the War Department as chief of the Transport and Automotive Branch, Production Division Headquarters, Army Service Forces, he was with the Chrysler Corp. for eleven years in key executive positions.

DUFF-NORTON MFG. Co., Pittsburgh, Pa., manufacturer of lifting jacks, has appointed Dale Christopher as district manager in the coal-mining areas of Pennsylvania, West Virginia, Kentucky, Alabama, Ohio, Indiana and Illinois, with headquarters at Morgantown, W. Va.

H. K. PORTER Co., INC., Pittsburgh, Pa., has appointed George L. Green as vice president of the company and its subsidiaries. As vice president of the Mt. Vernon Car Mfg. Division, he has been in charge

FOUND

A No-Cost Way to Ship Stoker Coal Iron-Free From the Mine!



Most operators recognize the desirability of shipping stoker coal without any iron in it. We always thought it was worth spending money to do it and sold Dings Magnetic Separators on that basis. Needless to say, we were not the least suprised to find that one of our good customers was making a direct profit on his Dings Pulley.

Here are the records based on data from C. B. Scholl, Chief Engineer, Boone County Coal Corp., Sharples, W. Va.:

Based on depreciating the Dings Pulley in 10 years (most Dings Pulleys last for 25 to 40 years) the annual costs for the first 10 years were $154.10 for depreciation and $85.54 for electricity, no maintenance or repairs. This totals $239.64, but the pulley recovered tramp iron that was sold as scrap for $243.00, netting $3.36 per year direct profit. The next 10 years should be "lulus."

It pays to buy the best in magnetic separators. Write to Dings for literature.

Dings Magnetic Separator Co.

506 East Smith Street, Milwaukee 7, Wis.

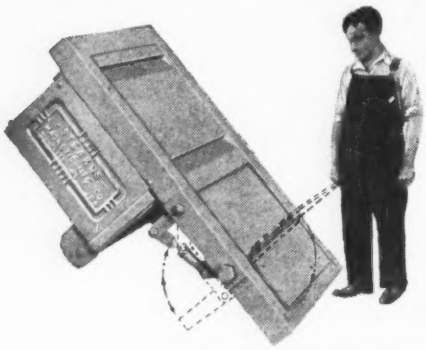
Dings MAGNETIC SEPARATION HIGH INTENSITY

NO MORE TRAMP IRON

with a

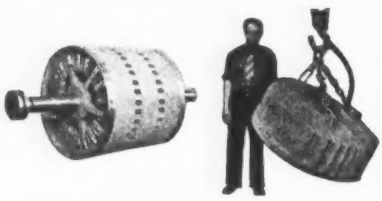
Stearns MAGNET

AUTOMATIC SPOUT TYPE SEPARATOR



If you have a "dirty coal" problem as the result of tramp iron and junk, it will pay you to investigate the STEARNS spout magnet shown above.

Built for rugged service, gives positive, automatic protection. In all sizes. Write for our Bulletin 97-A.



Also widely used are STEARNS improved air-cooled powerful Magnetic Pulleys (our Bulletin 302) and Suspended Magnets (Bulletin 25). Tell us about your capacities, plant layouts, etc.

STEARNS MAGNETIC MANUFACTURING CO.

661 S. 28th St., Milwaukee, Wis.

of freight-car sales, but henceforth he also will supervise sales of Porter, Devine and Quimby products in the Chicago area. Just returned from active duty as a major in the Corps of Engineers, U. S. Army, he served for 16 months as chief of the Petroleum and Fuel Branch, United Kingdom Base. Prior to the war he served twelve years as fuel engineer for the Consolidation Coal Co.

W. A. Jones Foundry & Machine Co., 4401 Roosevelt Road, Chicago 24, has elected F. H. Hoge as executive vice president, vice William Coleman, who resigned.

Fairbanks, Morse & Co. has appointed the Milwaukee Machinery Co., Portland, Ore., as distributor of its pumps. Milwaukee's pump department will be headed by W. H. Perry, who was with the Dallas branch of F. M. for many years. Cascade Machinery Co., Seattle, Wash., also will handle all F. M. pumping equipment, motors and electrical equipment, with the pump department in charge of Clyde A. Retter, recently employed at the Seattle branch of F. M.

Car Wood Industries, Inc., Detroit, has appointed Lieut. Com. Herbert F. McClure, U.S.N.R., as sales engineer of its hoist and body division. Before joining the Navy in 1942 he was for eight years associated with Freuhauf Trailer Co.

John A. Roebling's Sons Co. has promoted Firman G. Hoyt, salesman for the last six years at its Los Angeles branch, to the position of products sales manager of the woven wire fabrics division, Trenton, N. J.

Robins Conveyors, Inc., Passaic, N. J., has advanced Edwin M. Perrin, advertising manager since 1942, to assistant manager of equipment sales. He will work directly with A. E. Conover, whose equipment sales department is supervised by H. Von Thaden, first vice president.

E. I. du Pont de Nemours & Co. announces the retirement of Edmund T. Lednum, manager of the explosives department's branch office in Chicago. He is succeeded by Gilbert H. Smith. John J. Hefferman, manager of the explosives department's branch office at Joplin, Mo., also has retired and has been succeeded by Robert O. Cash. Both changes were effective Dec. 1.

Philco Corp. has appointed Frederick W. Roth as works manager of the storage battery division, Trenton, N. J. He joined the company's accounting department in 1933.

Atlas Powder Co., Wilmington, Del., has appointed Weston G. Frome as general manager of its explosives department, vice F. S. Pollock, vice president, who has been elected a member of the executive committee.

Allis-Chalmers Mfg. Co., Milwaukee, has appointed G. V. Woody to succeed R. C. Newhouse as manager of its basic industries department. Mr. Newhouse, who will be retained as a consulting engineer, retires after more than 40 years as engineer, inventor and designer of cement

FOR SAFETY'S SAKE, SUPERIOR COUPLINGS

Drop Forged Links

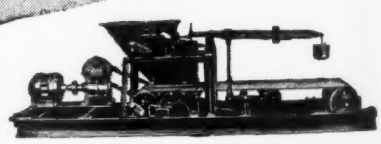
Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS

PITTSBURGH KNIFE & FORGE CO.

1421 Reedsdale St., N.S.
Pittsburgh 12, Pa.

Handle Sizing and Blending of Coal *Automatically* with the



SCHAFFER POIDOMETER

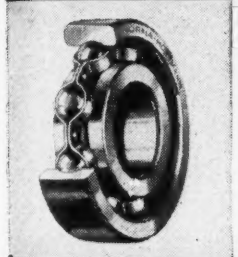
The SCHAFFER Poidometer automatically proportions, weighs and conveys crushed, granulated, and pulverized coal . . . according to the weights and proportions you want! These units can be used singly or in batteries . . . in pulley centers up to 35' 0", thus eliminating extra conveyors and expense. Our Catalog #8 explains the Poidometer in detail. Write for your copy today.

The Schaffer Poidometer Co.

2828 Smallman St.
Pittsburgh 22 Pennsylvania

PRECISION BEARINGS

Separable (Magneto) Ball Bearing



Single Row Ball Bearing

FOR EVERY LOAD, SPEED AND DUTY

108 DISTINCT SERIES

BALL, ROLLER AND THRUST

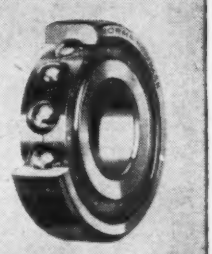
OVER 3000 SIZES

1/8" to 22 1/2" Bore—Metric and Inch Sizes

Write for the Catalog and Engineering Counsel

NORMA-HOFFMANN BEARINGS CORP'N.—STAMFORD, CONN., U. S. A.

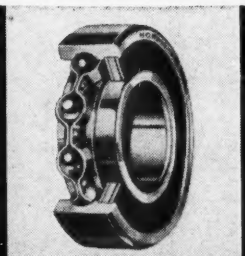
"NORMA-HOFFMANN"



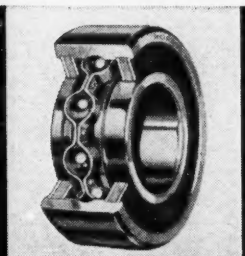
Litro ("CL") Composition Retainer Ball Bearing

Double Row Self-Aligning Ball Bearing

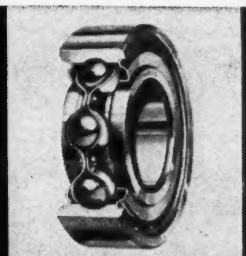
Shielded Type Single Row Ball Bearing



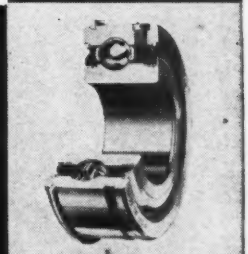
Single Felt Seal Ball Bearing



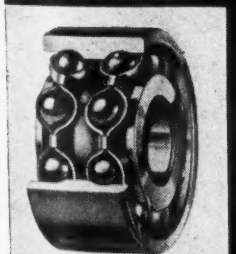
Double Felt Seal Ball Bearing



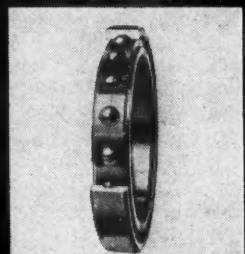
9000 Series (Feltless) Sealed Ball Bearing



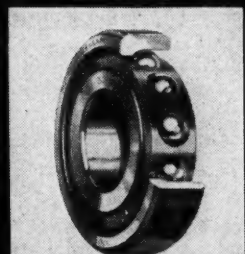
"Cartridge" Fully Sealed, Refillable Type Ball Bearing



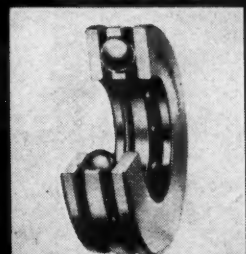
Double Row Ball Bearing



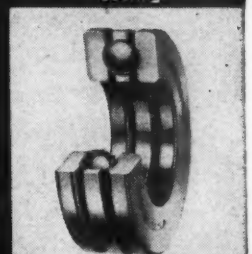
Extra Light Type Ball Bearing



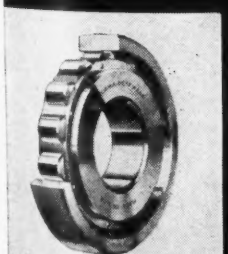
Angular Contact Ball Bearing



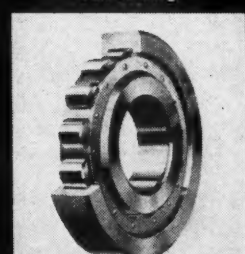
Extra Light Single Direction Ball Thrust Bearing



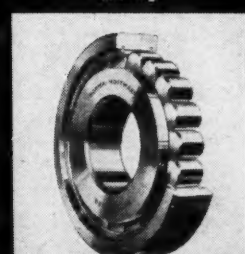
Single Direction Ball Thrust Bearing



Standard Cylindrical Roller Bearing

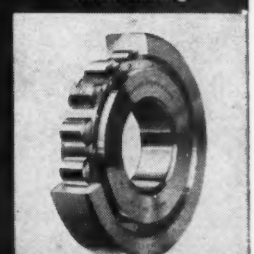


Type "E" Cylindrical Roller Bearing



Full Type (Retainerless) Cylindrical Roller Bearing

Extra Light Cylindrical Roller Bearing



Two-Lipped Cylindrical Roller Bearing

and mining machinery. Mr. Woody has been manager of the Pittsburgh office since 1934, although in 1941-2 he served as administrator of the company's priorities management organization in Milwaukee. J. K. Keogh, who joined the company in 1904, has been named manager of the Pittsburgh district office. J. L. Singleton, assistant manager of the steam turbine department, has been appointed manager for the 60 district offices of A. C. general machinery division's sales departments. He joined the company in 1926, was made Denver district office manager in 1938, was transferred to the West Allis works as assistant to the manager of the steam turbine department in 1942, and became assistant manager seven months later. E. L. Atkins has been appointed district manager at the tractor division office in Seattle, Wash., where he will represent the company's interests in Alaska, the Yukon and British Columbia. He succeeds S. B. Tatom, recently assigned to become president of Lomen Equipment, Inc., which handles A.C. equipment in Alaska.

Wood Shovel & Tool Co., Piqua, Ohio, has appointed V. G. Scott as manager of sales, vice N. T. Jacobs, deceased. Joining the Wood organization in 1942 as assistant manager of sales, Mr. Scott was named production manager in December, 1944. Before joining Wood he spent ten years in the sales department of Ames Baldwin Wyoming Co. and also was at one time in sales work with the Pittsburg Shovel Co.

Iron Fireman Mfg. Co. has appointed Howard M. Cutshaw as assistant sales manager with headquarters in Cleveland. He has been central division manager for several years, having joined the organization as a district representative in 1928. Thomas A. Marsh has been made manager of corporation sales. He has been national industrial engineer since 1934 and will retain this post in addition to his new duties.

American Car & Foundry Co. has named George K. Bradfield Jr. an assistant vice president, assisting E. D. Campbell, vice president in charge of engineering.

John J. Roberts, 72, retired president and one of the founders of Roberts & Schaefer Co., Chicago, died Nov. 3 in Miami, Fla. Born in Sadora, Ill., he attended the University of Illinois.

Trade Literature

Cutting Electrodes—Ellwood Products Corp., Ellwood City, Pa. Bulletin gives complete details and specifications, together with illustrated description of how to use Ellpro cutting electrodes for underwater or surface cutting.

Power Hammer — McKiernan-Terry Corp., Park Row Building, New York 7. Bulletin 56, "The Mechanical Blacksmith's Helper," gives detailed description of the hammer's design and construction, with specifications, supplemented by a concise tabulated list of the advantages and savings claimed for it.

Shovels—Alphabetical Shovel Co., Mt. Vernon, Ill. Bulletin describes "Victory" coal shovels and hollow back shovels, made from special tempered steel with good, solid handles.

Water Treatment—American K. A. T. Corp., 331 Madison Ave., New York 17. Bulletin 33 tells how all-colloidal water treatment can benefit steam users in process work in more efficient and lower-cost steam generation, elimination of shutdowns and preservation of equipment.

Maintaining Synthetic Tires and Tubes in Coal Mining—B. F. Goodrich Co., Akron, Ohio. Bulletin points out that proper selection is starting point in prolonging life of tires and tubes, though load, inflation, road condition, driver training and repairing, retreading and mounting also important. This bulletin is based on a reprint of an article appearing in the September, 1945, issue of *Coal Age*.

Rubber and Synthetic Products—B. F. Goodrich Co., Akron, Ohio. Booklet on rubber and synthetic products suggests application of these products to industrial designers. Opening pages are devoted to Koroseal, the synthetic flexible material of many uses. Physical and chemical properties are outlined in detail, as well as uses where it has solved problems that had proved baffling when other materials were tried. Two pages are given to a description of the company's diversified line of Vibro-Insulators, devices of rubber and metal that reduce vibrations of machinery and the buildings in which they are situated, as well as lessening fatigue of workers and saving wear and tear of equipment. The company's Torsilastic rubber spring, in which rubber in torsion is used as a suspension for vehicles, is included and its advantages over older materials described. Rubber-lined equipment, including tanks and tank cars for handling corrosive acids or alkalis, as well as valves, pipes and fittings that serve the same purpose are described and pictured, with a table of dimensions of standard Vulcalock rubber-lined tanks. Other products of interest are molded, extruded and lathe-cut rubber; synthetic rubber and plastic products; Anode rubber coverings for any smooth or irregular shaped metal part; the new pressure sealing zipper, a watertight, airtight and pressure-tight seal that zips up swiftly; water-lubricated cutless rubber bearings; FHP and multi-V belts, adhesives; sponge, hard and sheet rubber.

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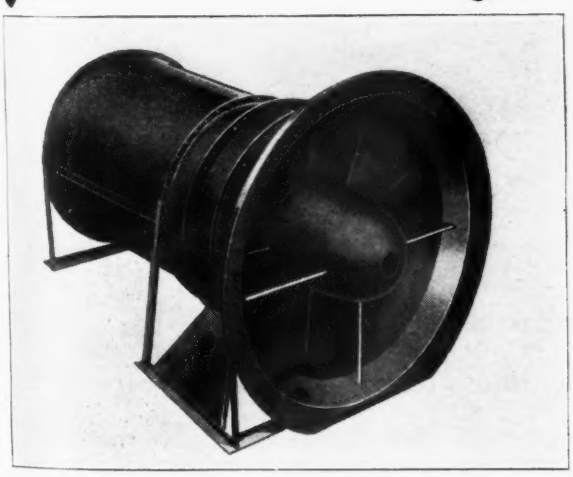


BUFFALO AXIAL FLOW MINE FANS

For those installations where an axial flow fan is desirable, Buffalo has a complete line of high efficiency fans. Making both types, Buffalo engineers are able to make unbiased recommendations.

● There was a time when mine operators used as little ventilation as possible. Those days are gone forever, because it has been clearly demonstrated that plenty of fresh air below ground is a good investment.

Buffalo fans for mine ventilation are built to give maximum efficiency "on the job". They have the Buffalo non-overloading power characteristic which means that regardless of delivery conditions, motors cannot overload. They have the rugged construction necessary to guarantee long life. By actual test, they deliver more air per horsepower. And —they cost no more than other good fans. Why not ask for recommendations on your requirements?

BUFFALO FORGE COMPANY

147 Mortimer St. **Buffalo, N. Y.**

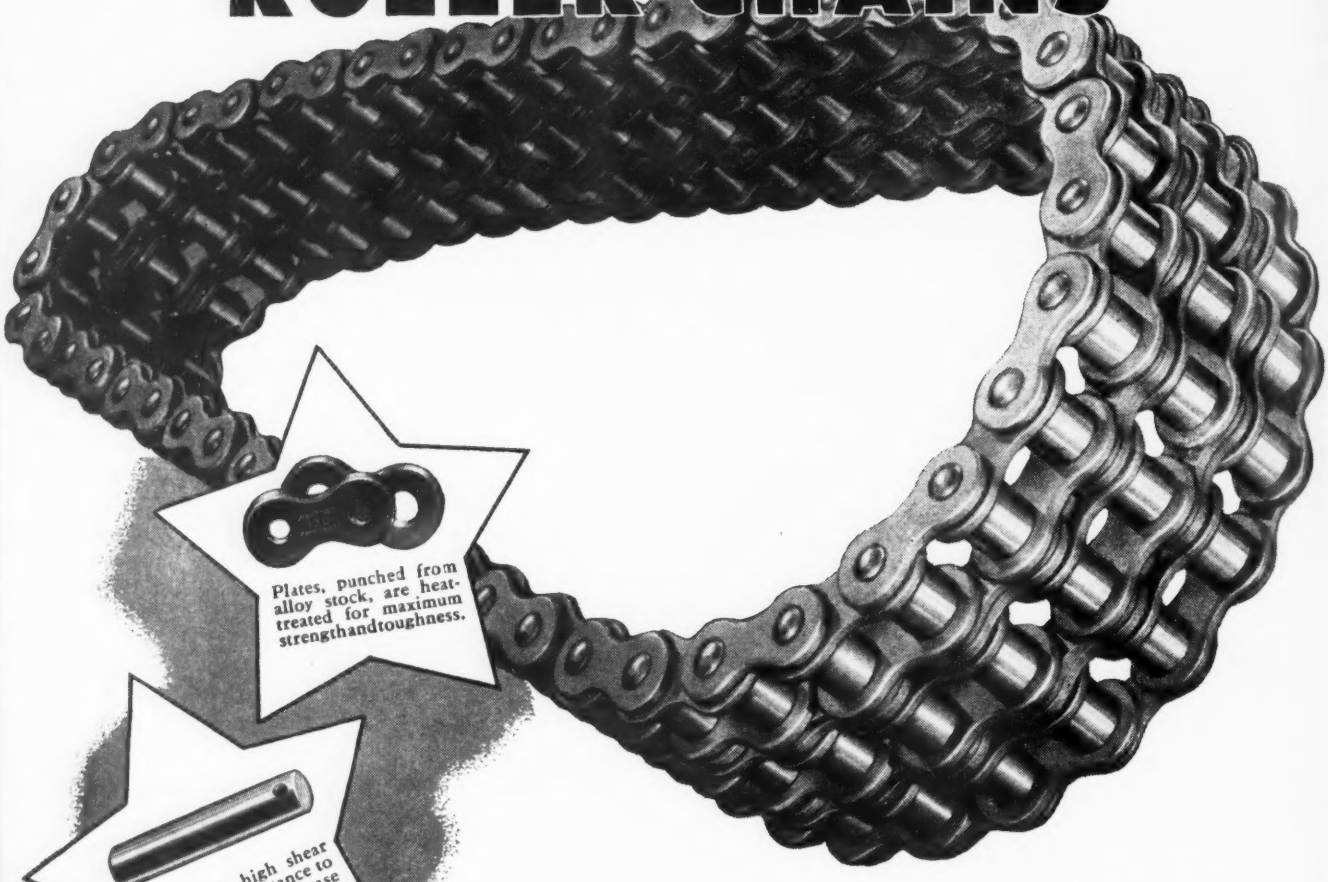
Canadian Blower & Forge Co., Ltd. **Kitchener, Ont.**

"Buffalo" **MINE FANS**

The Four-Star Construction of

WHITNEY

ROLLER CHAINS



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Pins have high shear value and resistance to wear. They are case hardened and center-less ground.

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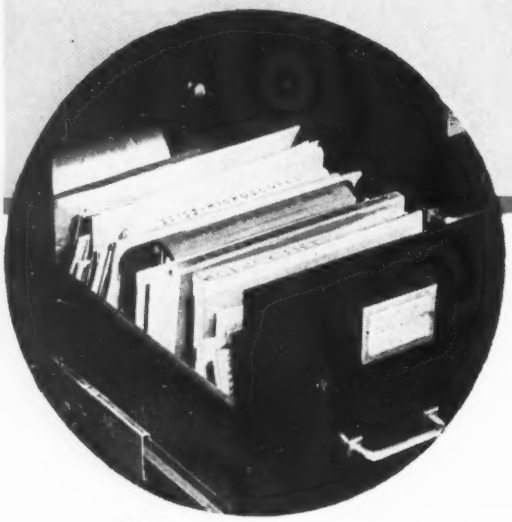

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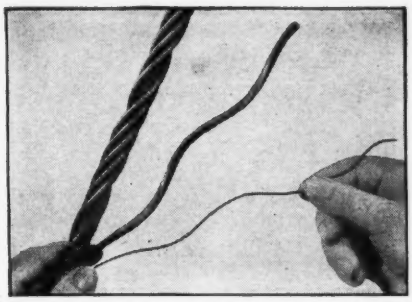

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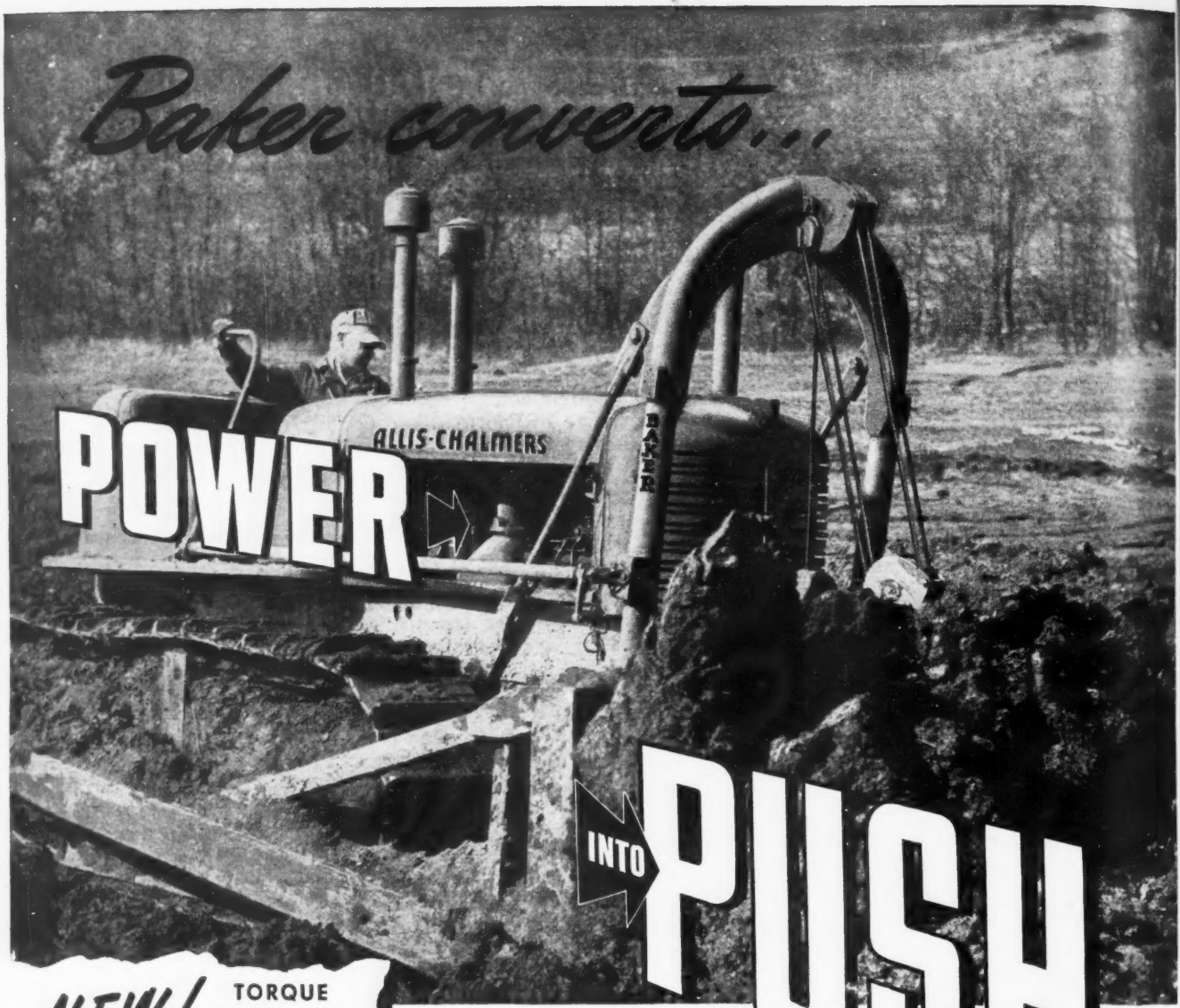

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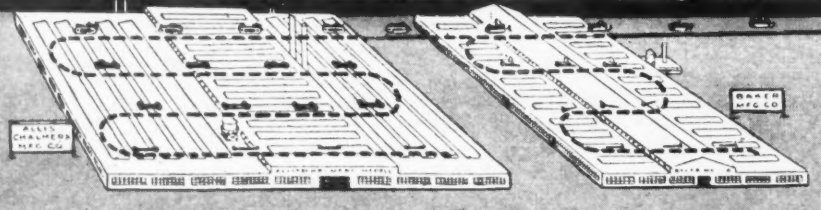

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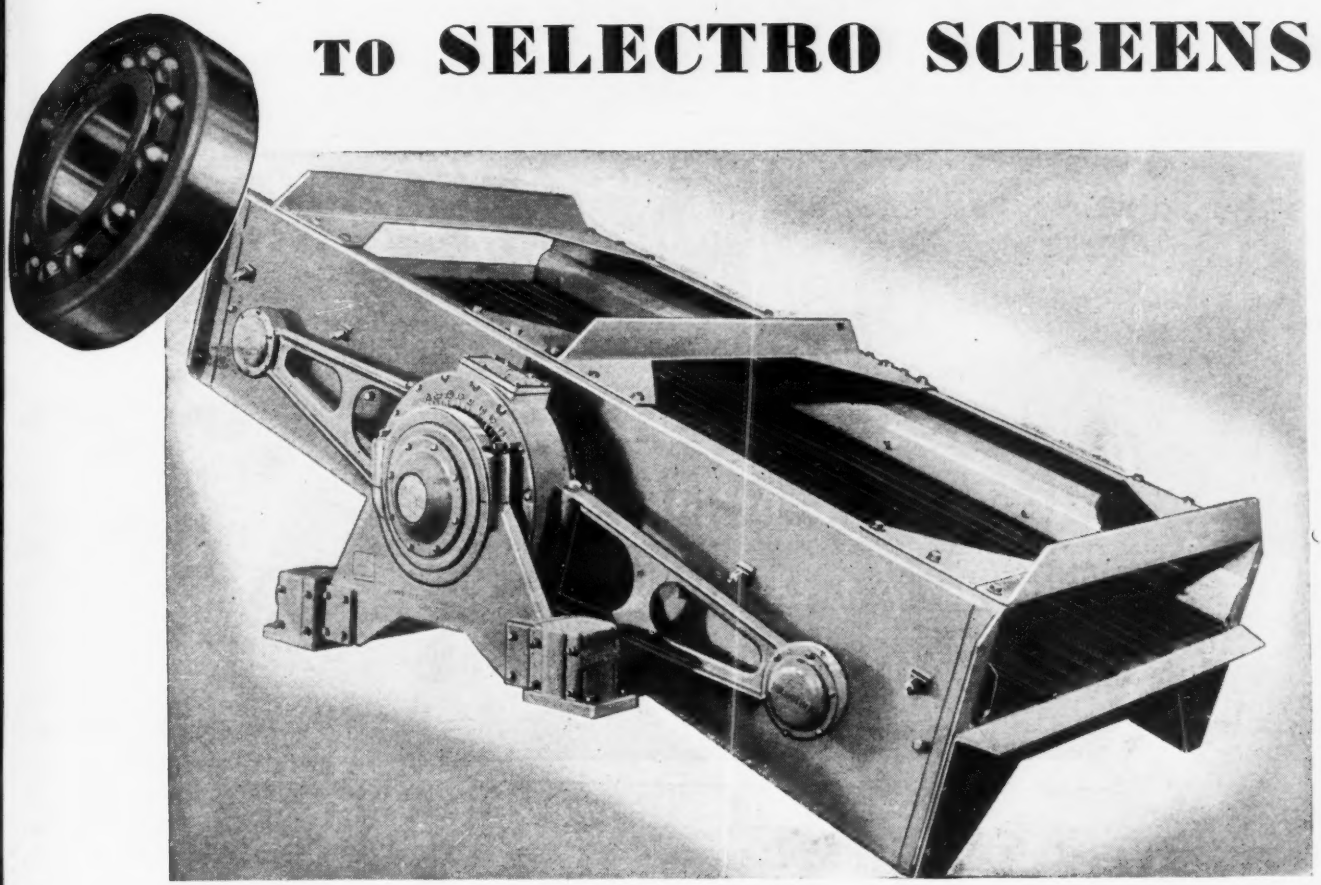

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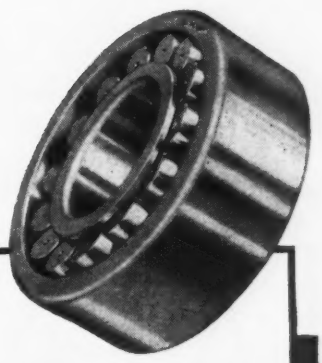

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SKF PUTS THE RIGHT BEARING IN THE RIGHT PLACE

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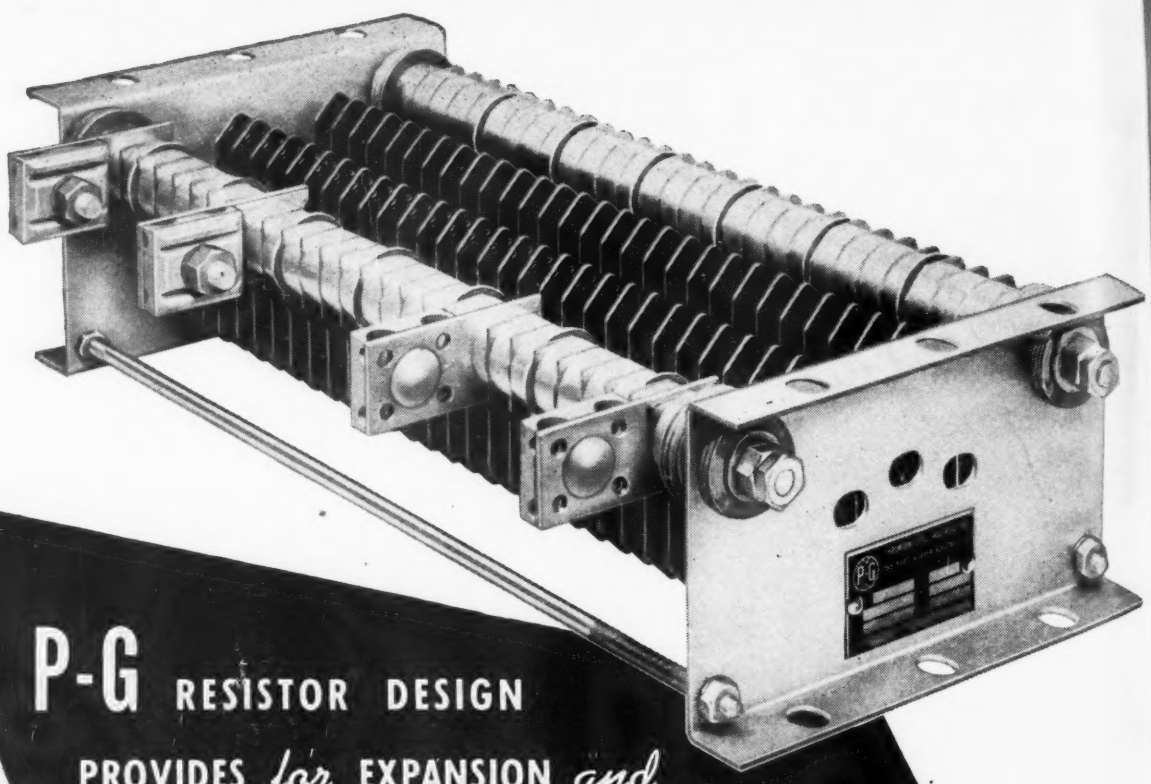

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MODEL G-37 AY DISSTON CHAIN SAW *with Mercury Gasoline Engine*

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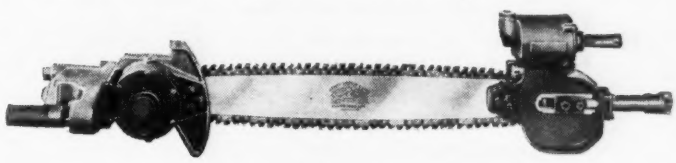

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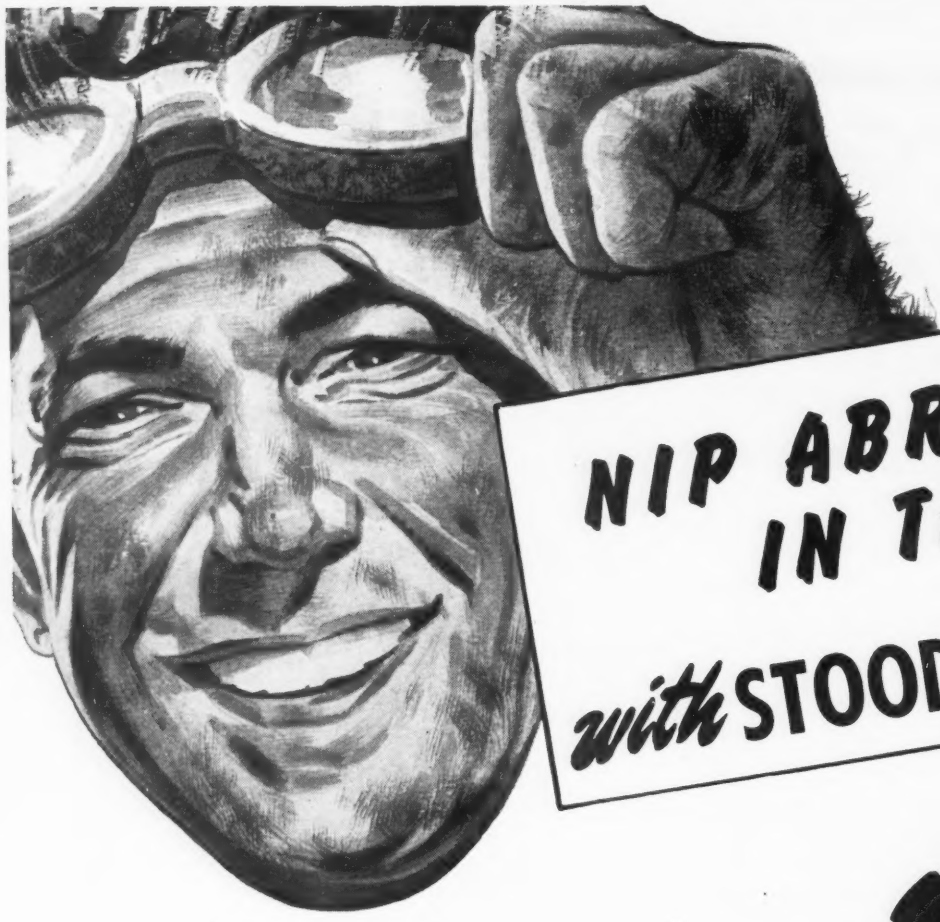
- Muffler prevents exhaust from annoying operator.
- Equipped with "L" pattern chains.
- Equipped with 3-rib protection cradle underneath engine.
- 3-7 H.P. Models; 5-11 H.P. Models—Capacities 24" to 84".

HENRY DISSTON & SONS, INC., 1242 Tacony, Philadelphia 35, Pa., U. S. A.



NIP ABRASION IN THE BUD *with* STOODY ALLOYS

STOODY HARD-FACING ALLOYS are available in many types to overcome the diversified wear problems encountered in mining equipment. Each is especially designed for some special characteristic or combination of properties. For example:

BOROD and TUBE BORIUM

deposits cover wearing surfaces with a thin layer of tungsten carbide particles of selected size. Tungsten carbide, being the hardest of all commercial metals, produces unmatched wear resistance—keeps cutting edges and points, such as coal cutter bits, sharp and out to size.

STOODY SELF-HARDENING

provides both wear resistance and ability to take shock, has added advantages in ease of application and ability to bond directly with manganese steels without use of intermediate welding rods.

STOODITE

provides homogeneous deposits of extreme wear resistance which polish to high surface finishes; is suitable for bearing supported shafts operating in abrasive conditions and straight abrasion problems where limited shock is present.

STOODY 6 and STOODY 1

bring you combinations of heat, corrosion, impact and wear resistance.

The complete range of Stoody alloys gives you a selection of hard-facing materials for any wear problem unmatched by any other hard-facing manufacturer. If you have wear problems, consult our engineering department for free advice. District engineers maintained in principal industrial areas for your benefit.

STOODY COMPANY

1143 WEST SLAUSON AVENUE • WHITTIER, CALIFORNIA

STOODY HARD-FACING ALLOYS

Retard Wear **Save Repair**

THEY'RE HERE!

NEW LPC CARRIMORS*

...IN 8 AND 14 YARD SIZES!

COMPLETELY NEW FROM THE GROUND UP AND THOROUGHLY PROVED BY 2 YEARS OF TESTING

Everyone who has seen these new LaPlant-Choate scrapers in action has been quick to admit that "they have all the good points of other rigs—*and a lot more besides.*" Moreover, on scores of tough earthmoving jobs from coast to coast, these greatly improved cable outfits are proving far superior to competitive equipment in all phases of operation. But don't take our word for it. Ask your nearest LaPlant-Choate "Caterpillar" distributor to take you to see the new LPC's working. Then you'll learn why so many agree on LPC for *lowest possible cost per yard*—wherever tractor-drawn scrapers are indicated. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; San Leandro, California.

*Reg. U.S. Pat. Off.

ONLY Scrapers in the World with ALL These Profit-Making Features

Easier Loading

Because of generous initial apron opening without movement of rear gate. Curved bowl design plus smooth interior and special offset cutting edges produce continuous "fountain action" in loading, while exclusive eccentric hoist sheaves permit effective "pumping" in loose material.

Easier Hauling

Thanks to lower draft, shorter wheel base and elimination of excess weight. Newly designed apron retains load under all conditions.

Faster, Cleaner Dumping

Because of positive forced ejection. Rear gate actually bulldozes the material out, scraping bottom and sides of bowl perfectly clean. High lifting apron moves ahead with rear gate, assuring speedy unloading of all materials, without sticking or jamming.

More Accurate Spreading

Assured by improved positive control.

Greater Stability

Thanks to low center of gravity and freedom from bulky overhead structures.

Greater Utility

Because wide, open-top bowl also permits overhead loading with shovel drag-line or bin.

LAPLANT EARTHMOVING AND LAND CHOATE CLEARING EQUIPMENT

Get More Tonnage

out of Loaders... Cutters and Locomotives with

Crippled equipment and high tonnage demands don't add up. Years of double-time wear and tear has been tough on cutters, loaders and locomotives... internal wiring that wasn't built to take punishment has been taking a beating from hot resistor grids, conductor-heating overloads, vibration and the rotting action of grease and oil.

And there's no let-up in sight... but you can keep your machines producing by rewiring with Rockbestos A.V.C. Mining Cable. Use it for jumpers between controllers and resistors, coil connections and motor leads...and you'll get more tonnage by eliminating cable-failures that keep equipment idle when it should be working.

For more tonnage at lower cost . . . keep production **up and maintenance down with** Rockbestos A.V.C. . . . used and recommended by leading equipment manufacturers and mine electricians for over 16 years. Send for a sample.

ROCKBESTOS PRODUCTS CORPORATION
P. O. Drawer 1102, New Haven 4, Conn.

THE ORIGINAL ROCKBESTOS A.V.C. CONSTRUCTION

1 Heatproof, fireproof, rugged impregnated asbestos yarn braid resistant to moisture, oil, grease, and alkalies and diametered to fit bushings properly.

2 Felted asbestos insulation, impregnated with heat, flame and moisture resistant compounds like the braid; will not dry out, bake brittle, crack, flow or burn—a real barrier against the destruction caused by heat and travelling wire-fires.

3 Lubricated varnished cambric for high dielectric strength and added moisture resistance—protected from heat, flame and oxidation by two felted asbestos walls.

4 Inner felted asbestos insulating wall, also impregnated with heat, flame and moisture resisting compounds, withstands conductor-heating overloads and won't bake brittle or burn.

5 Paper separator to make stripping easy and prevent the insulation from sticking to the conductor.

6 Flexible tinned copper conductor, perfectly and permanently centered in helically applied non-flowing insulation.

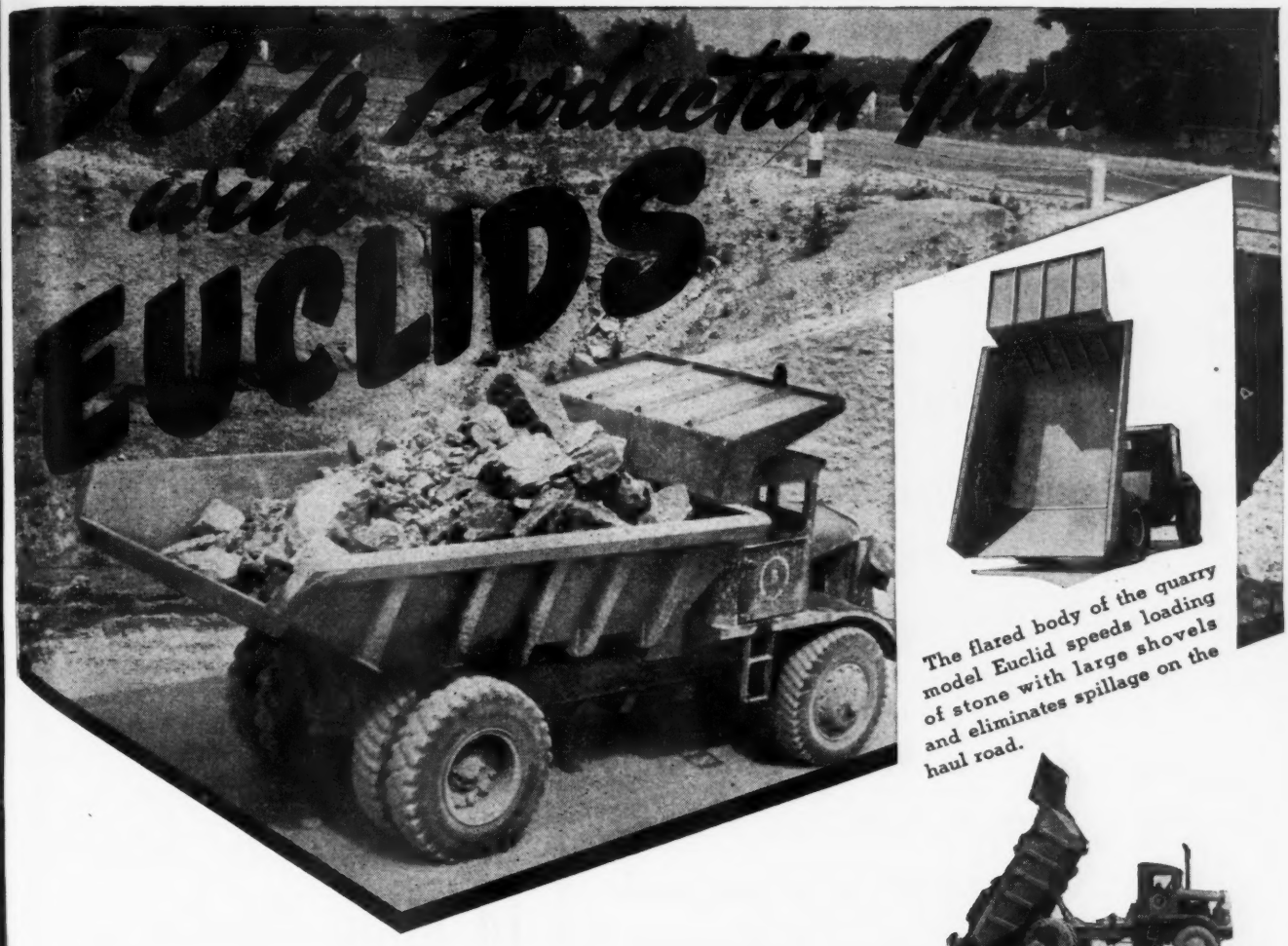
This construction is one of 125 developed for severe or unusual operating conditions by Rockbestos.

ROCKBESTOS A.V.C. *The Cable with Permanent Insulation*

ORDER FROM THESE JOBBERS—SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.:	Beckley Mach. & Elec. Co.	EVANSVILLE, IND.:	Evansville Elec. & Mfg. Co.	PITTSBURGH, PA.:	Upson-Walton Co.
BIRMINGHAM, ALA.:	Moore-Handley Hdwe. Co.	FAIRMONT, W. VA.:	Fairmont Supply Co.		Westinghouse Elec. Supply Co.
BLUEFIELD, W. VA.:	Superior-Sterling Co.	HUNTINGTON, W. VA.:	Banks-Miller Supply Co.	SCRANTON, PA.:	Penn. Elec. Engineering Co.
CHARLESTON, W.VA.:	Charleston Elec. Supply Co.	LOTHAIR, KY.:	Mine Service Co.	WHEELING, W. VA.:	Westinghouse Elec. Supply Co.
CLEVELAND, OHIO:	Upson-Walton Co.	MIDDLEBORO, KY.:	Rogan & Rogan Co.	WILLIAMSON, W.VA.:	Williamson Supply Co.

INVEST IN U. S. VICTORY BONDS



The flared body of the quarry model Euclid speeds loading of stone with large shovels and eliminates spillage on the haul road.

Tapered chute construction and high dumping angle mean quick, clean shedding of the load — save time in dumping.

● After more than 40 years of quarry operation by rail, The Bessemer Limestone and Cement Co. converted its haulage system to heavy duty trucks thereby achieving a production increase of approximately 30%. The job involves removal of overburden and delivery of blasted rock to a crushing plant. At this quarry in western Pennsylvania, Bessemer operates 5 Quarry Type Rear-Dump Euclids.

After receiving a 15-ton load from a 5 cu. yd. shovel, the Euclids travel 6500 feet to the crushing plant at an average speed of 12.3 m.p.h. Total round trip time averages 13 minutes — better than 4 trips per hour.

The flexibility of truck haulage over constantly changing roads has resulted in lower costs and increased production. For overburden removal, too, Euclids have proved their efficiency and dependability.

Have you investigated the possibilities of Euclids for your own operations? Your distributor can supply helpful information and literature.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

★

EUCLID EARTH MOVERS

Rear-Dump Euclids
Capacities of 15 to 22 tons — 9.2 to 20.7 cu. yds., struck... loaded top speeds of 22 to 35 m.p.h.... powered by 150 to 275 h.p. Diesel engines.

Bottom-Dump Euclids
Capacities of 20 to 32 tons — 13 to 42.9 cu. yds., struck... loaded speeds from 26 to 34.4 m.p.h.... powered by 150 to 275 h.p. Diesel engines.

Euclid Loader
Fast loading of hauling equipment ...makes shallow cuts to 9'6" wide... maximum cutting depth of 24"...54" belt powered by 150 h.p. engine.

Calcium Chloride Freezeproofs Coal Makes It Dustless, Too

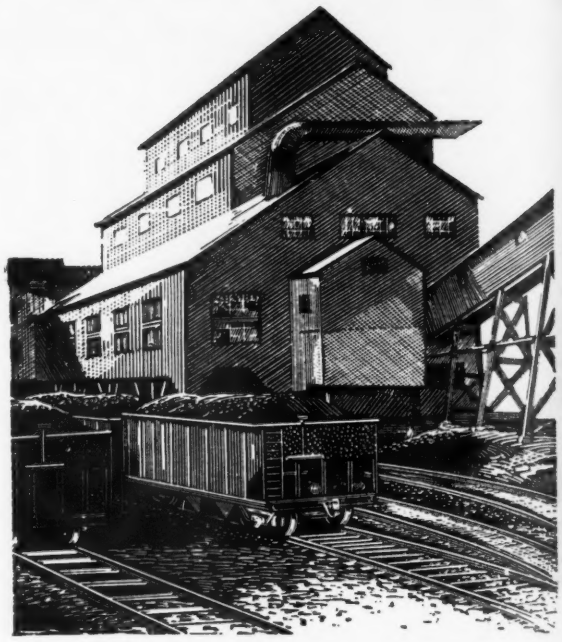
Adequate treatment with calcium chloride solves those twin problems of the coal industry so annoying to both dealers and consumers—dusty coal and frozen coal.

This double purpose treatment with clean, odorless calcium chloride reduces fire hazards, leaves no residue odor, pleases every user.

Dealers save unloading time and money. Consumers save housecleaning and redecoration expense and the mines keep their customers. Competition of other fuels makes it doubly important.

Calcium Chloride Association
4145 Penobscot Building
Detroit 26, Michigan

CALCIUM CHLORIDE
Freezeproofs and
Dustproofs Coal
in One Operation



Many Other Uses In Mine Operation

Dust Control on shuttle car and haulage roads in mines.

Consolidation and maintenance of mine access and strip mine roads.

Ice Control.

Freezeproofing of fire barrels.

Thawing of earth, to expedite winter excavation.

Separation medium for coal washers.

High early strength concrete.

We call them our Sales Force — but the term is wrong.

These are the men who make the House of Hartwell.

The men who *mean* the House of Hartwell to hundreds of our retailers and consumers in cities and towns that spread throughout New England.

Their intimate personal contacts have extended through the years.

They don't sell coal — they *merchandise* it. They're an integral part of our retailers' business — a rock of dependability to our industrial consumers.

Did we curtail after Pearl Harbor? Did we lose the value of these thoroughly trained, capable, experienced marketing experts?

No! Emphatically No! Our pre-Pearl Harbor Hartwell sales personnel is intact . . . and so are their customer relationships.

Our complete organization in fact was never more ready to serve our customers and our carefully chosen suppliers in the busy competitive days ahead. And, furthermore, this solid front is being expanded to increase our influence and scope.

With augmented facilities now underway, we are able, at the moment, to consider a limited number of new sources of the same high calibre of those whom we now so proudly serve.

If you have a coal distribution and marketing problem in New England, we would be happy to discuss it with you. Write, wire or phone.

Member AMERICAN COAL Sales ASSOCIATION

H. N. HARTWELL & SON, Inc.

Dock Operators · COAL · Distributors

Park Square Bldg. BOSTON, MASS.

Getting the coal from dump truck to car bin can be the simplest and cheapest step in your whole series of strip mine operations—if you install a Barber-Greene Permanent Conveyor to do the job.

In a set-up like this, B-G Conveyors fit perfectly. They're built of *standardized* units in a variety of capacities and horsepower ratings. Factory assembly of terminals assures correct alignment . . . minimum belt wear and maintenance. *Pre-engineering* eliminates special engineering at the location. And your own workmen can erect this B-G Conveyor quickly and easily by merely bolting the conveniently marked sections together.

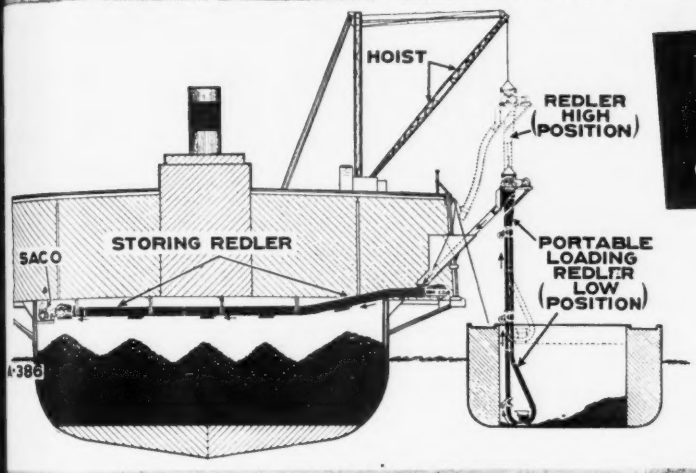
You'll get *extra* years of service from B-G equipment, for rugged construction is a Barber-Greene characteristic. Barber-Greene Company, Aurora, Illinois.

Photo shows B-G Permanent Conveyor loading run-of-mine coal, and consisting of Pre-engineered, Factory-assembled Drive End, Standard B-G Truss and Walkway, Troughing Carriers, 36-inch Belt. Dump truck discharges into Hopper over conveyor tail end onto B-G Bar-flight Feeder.

Barber-Greene B G *Constant Flow Equipment*

The Problem — to move coal from barge to bunker of ship quickly and economically.

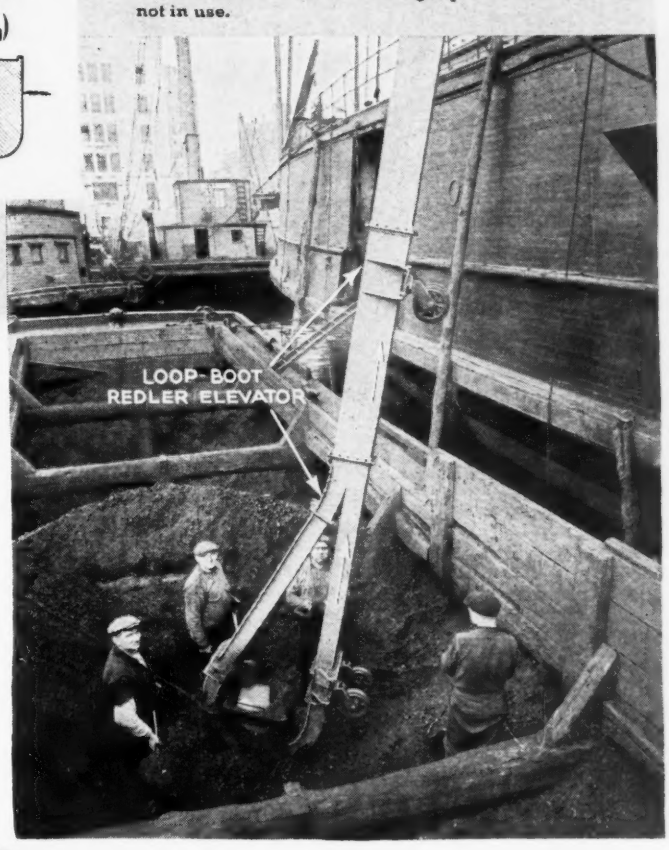
the **S-A** *Answer*



Cross section of REDLER Loading System. Note how easy it is for the ship's simple hoist mechanism to lower the REDLER Elevator into the barge.

DOES THE JOB AT *a Minimum* COST!

Portable loop-boot REDLER Elevator is shown below in position to receive coal from barge. Casters permit elevator to be rolled into storage space on deck when not in use.



A specially-designed S-A REDLER Elevator and conveyor system is doing a standout job on this ship. When coal is ready to be taken aboard, a portable loop-boot REDLER Elevator is lowered by the ship's crane to a barge. Coal is fed into a choke feed opening in the base of this REDLER . . . elevated to a flexible discharge spout . . . fed into a horizontal REDLER Conveyor mounted over the coal bins . . . and finally discharged into bunkers through openings in the bottom of conveyor.

Here again is proof that, no matter what the problem or how unusual the operation, S-A engineering and equipment can invariably furnish a workable low-cost solution.

STEPHEN S-A ADAMSON MFG. CO.

2 RIDGEWAY AVENUE, AURORA, ILLINOIS ★ LOS ANGELES, CALIF. ★ BELLEVILLE, ONT.

Designers and Manufacturers of All Types of

BULK MATERIAL HANDLING EQUIPMENT

...30 YEARS...

IS A LONG TIME TO STAY YOUNG IN BUSINESS..

.... ***yet*** "Slim" (L. K. if you want to be formal) von Perbandt has been with the Allen & Garcia Company that length of time as of November 15, 1945.

As the G. I. has "dirt behind his ears," Slim has had "coal in his hair" since his earlier days with Goodman and Link-Belt.

TOP OF THE FIELD

Personal engineering knowledge is a vital factor in the services offered by the Allen & Garcia Co. Our engineering specialists have a wealth of accumulated experience gained from world-wide producing areas. Collectively, they have secured data from every seam in this country and many other countries.

All of this experience, with an understanding of coal mining conditions and problems is available to you. Consultation does not entail any obligation on your part.

ALLEN & GARCIA COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

332 S. MICHIGAN AVE., CHICAGO 4, ILL. • 120 WALL ST., NEW YORK, N. Y.

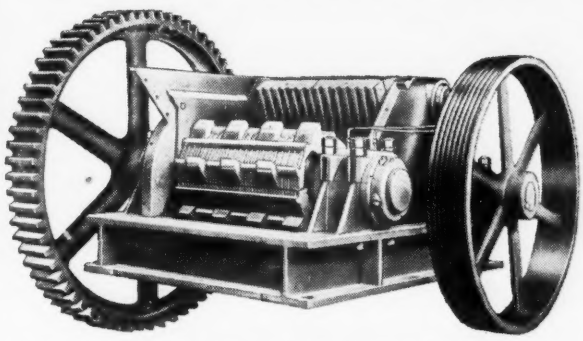
A DOZEN GOOD REASONS

FOR CHOOSING

McLANAHAN

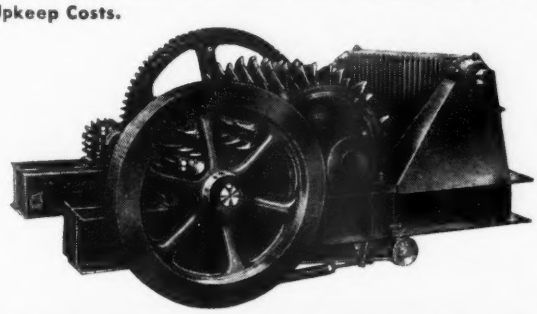
SINGLE ROLL

MINE REFUSE AND COAL CRUSHERS



THE ROCKMASTER AUTOMATIC STEELSTRUT TOGGLE CRUSHER— REMARKABLE POWER AT LOW COST

1. All Steel Constructed 2. Cast Steel Gears 3. Automatic Steelstrut Toggle for Tramp Iron Protection 4. Chilled Alloy Iron or Steel, Interchangeable or Reversible Crushing Plate Liners 5. Hard Surfaced Steel Segment Rolls Easily Replaced Without Dismantling Machine 6. Takes Choke Feed—Mechanical Feeders Not Necessary 7. Dry, Muddy, Wet or Frozen Material Never Packs 8. Lowest Proportion of Flats and Dust Produced 9. Slowest Speed of Moving Crushing Elements 10. Greatest Crushing *Range* With Opening Easily Adjustable 11. Takes Large Primary Sizes 12. Low First Cost—Low Power Cost—Minimum Repair and Upkeep Costs.



THE STEELSTRUT SLEDGE-WEDGE CRUSHER HIGHEST TON-PER-DOLLAR VALUE

Modernize your present plant with modern dependable, low cost McLanahan equipment. Write for descriptive Bulletins today.

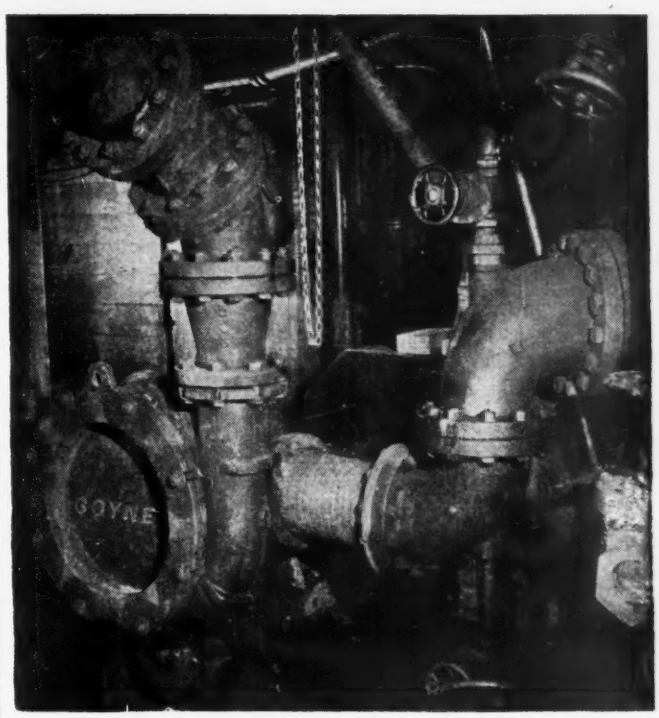
McLANAHAN & STONE CORPORATION

Pit, Mine and Quarry Equipment Headquarters

Since 1835

HOLLIDAYSBURG, PENNSYLVANIA

GOYNE PROCESS PUMPS



A Sand Pump is only a link in a chain in a coal washing plant, but it can be a strong link if it embodies the following features as does the Goyne:

1. **Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing only the rear head of the pump. No suction or discharge piping is disturbed.**

2. **The one packing box of the pump subjected only to suction pressure and is readily kept clean by a low pressure clear water line. Long packing and shaft sleeve life is assured.**

3. **Impeller clearance is adjusted *while the pump is running*, insuring constant pump capacity so essential for uniform washing.**

4. **There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.**

5. **We carry the spare parts stock. Order your replacements when needed. Reduced your inventory by using Goyne Process Pumps.**

All inquiries receive prompt and careful attention.

THE GOYNE STEAM PUMP CO.

ASHLAND, PA.

WINTER IS APPROACHING—WATCH YOUR VENTILATION

ADEQUATE AIR *with* SUFFICIENT VELOCITY

Controlled with Canton Automatic Mine Doors will Prevent

MINE EXPLOSIONS

A lurking pocket of gas, allowed to accumulate because of insufficient velocity of air, is back of nearly every mine explosion.

Velocity of air is destroyed by splitting the air too frequently with overcasts; by hanging brattice cloth where doors should be used; by hand trapped or other doors which remain open too long and short circuit the air otherwise under control. A supposedly non-gaseous mine is the most dangerous and results in the greatest toll of life when an explosion occurs because it creates a false sense of security, inviting catastrophe.

The American Mine Door Company 2059 DUEBER AVE. CANTON 6, OHIO

IMPROVED SUTTON SAND DRYING STOVE

The same time tested principle for drying sand as used in Sutton STANDARD Sand Drying Stoves for more than forty years is employed in the No. 0 Sutton IMPROVED Sand Dryer.

NEW FEATURES

- PERFORATED RING of an entirely new design.
- A FIRE BOWL added between the grate and perforated ring.

  New type FIRE GRATE.
- ASH PIT DOOR EXTENSION to protect clean sand from ashes.
- 3/16" STEEL PERFORATED SKIRTING with clean out Doors
- ECONOMY FLAME SPREADER in dome.

Catalog and Prices sent upon request.

INDIANA FOUNDRY COMPANY

950 Oak Street, Indiana, Pa.

The Cincinnati

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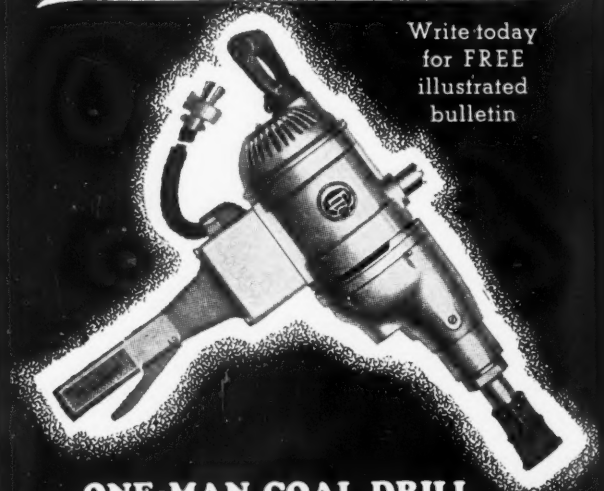
Write today for FREE illustrated bulletin

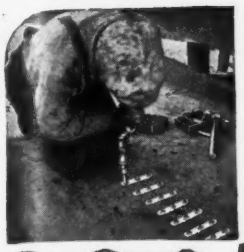


ONE-MAN COAL DRILL

. . . lowers drilling costs because it is designed and constructed to give more power "pound for pound" and more drilling efficiency "day after day". Used successfully in drilling both anthracite and bituminous coal. Easy to operate. Sold with money-back guarantee. Write today.

THE CINCINNATI ELECTRICAL TOOL CO.

Division of The R. K. LeBlond Machine Tool Co.
2635 MADISON ROAD - CINCINNATI 8, OHIO

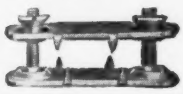


Keep your conveyor belts going with

FLEXCO

HD BELT FASTENERS

• **FLEXCO H D RIP PLATES** are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.



• **FLEXCO H D BELT FASTENERS** make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

Write for your copy

FLEXIBLE STEEL LACING COMPANY
4638 Lexington St., Chicago 44, Illinois

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

NEW LIFE FOR OLD CABLES

7 Point Superiority

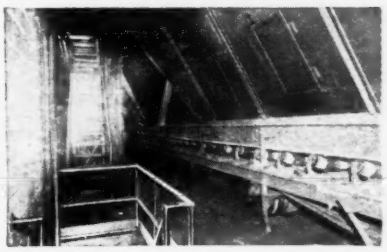
1 Double grip . . . both sides adhesive.
2 Great tensile strength . . . tough.
3 Won't tear, ravel or pucker.
4 Resists abrasion.
5 Acid- and alkali-proof.
6 Extra thick . . . one layer insulates.
7 Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

RUBEROID

INSULATING TAPE

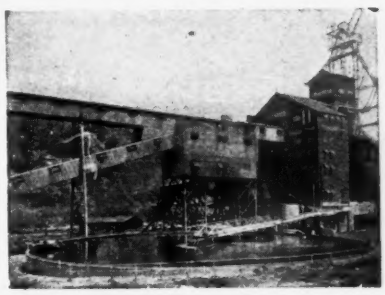
The RUBEROID Co., Executive Offices, 500 Fifth Avenue, New York 18, N. Y.

"PENNSYLVANIA"



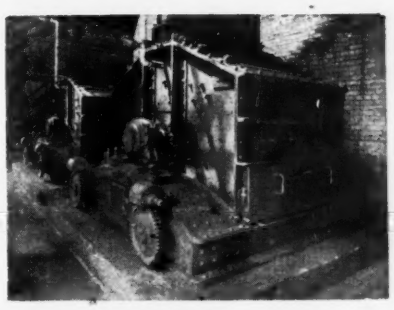
"PENNSYLVANIA"

Bradford - Hammermills, —2 size 12' x 22',—delivering to Belt 1400 tons of prepared coal hourly, at one of the world's largest Generating Stations.



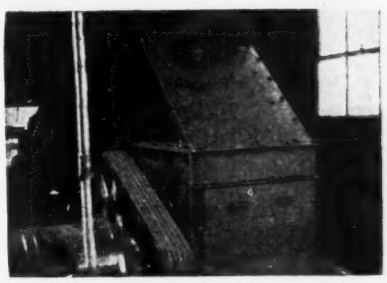
"PENNSYLVANIA"

BRADFORD COAL BREAKER and Cleaner preparing 500 tons of ROM to 4½" size for washing.



"PENNSYLVANIA"

REVERSIBLE HAMMERMILLS preparing Bradford-treated coking coals for By-Product Ovens,— at the rate of 600 tons per hour.



"PENNSYLVANIA"

SLOW SPEED GRANULATOR preparing "Premium" Domestic Stoker Sizes at Mine.

"PENNSYLVANIA"

SINGLE ROLL CRUSHER, adjustable for 1" to 8" crushing, with automatic Tramp Iron protection, preparing Commercial Sizes at Mine.

World-wide installations of these "Pennsylvania" STEELBUILT types, prepare approx. 300,000,000 tons of Steam and Coking Coals per annum.

Experience gained from these installations during the past 40 years is at your service.

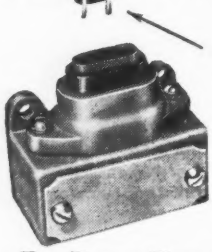
General Offices: Liberty Trust Bldg., Philadelphia

PENNSYLVANIA CRUSHER COMPANY

Associated with Fraser & Chalmers Engrs. Wks., London

COAL PREPARATION

MINES
Cable Connectors



Portable

Stationary

For Power Transmission

Single or Multi-Conductor

Heavy Duty

Water Sealed

Molded Rubber or Synthetic

Can Be Molded at Factory to Specifications on Your Cords or Cables

Stand Rough Handling and Difficult Conditions

Capacities from 5 to 500 Amperes

Voltages Up to 5000

Carried in Stock in Standard Designs and Sizes and Can Be Made Up Special to Meet Your Specific Requirements.

Write for Bulletin MC-106, showing many successful applications of Mines Connectors throughout industry.

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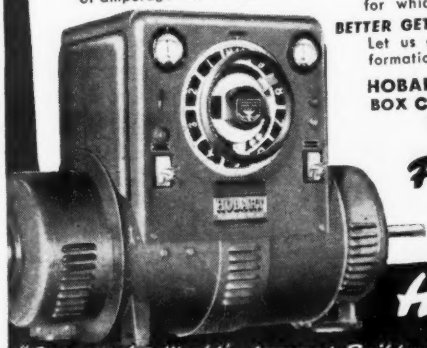

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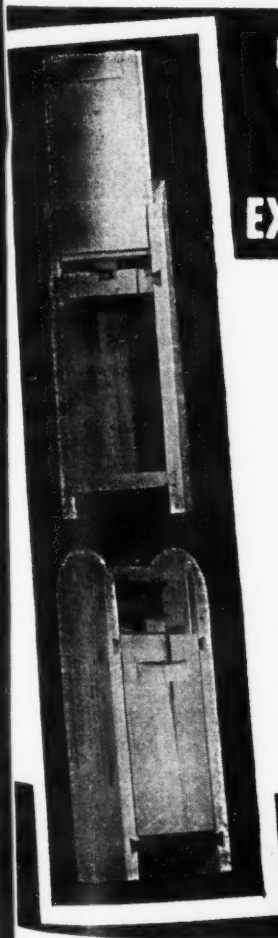

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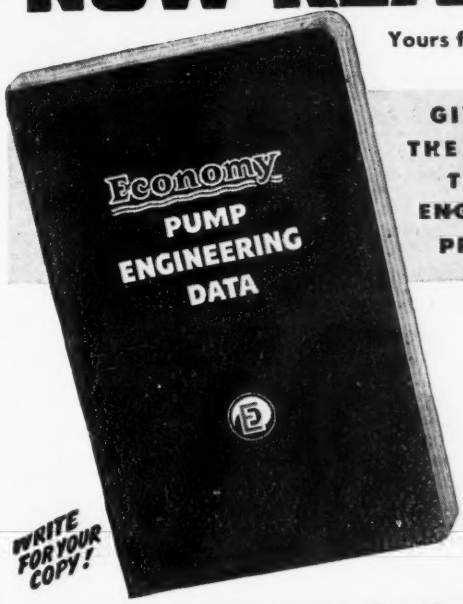

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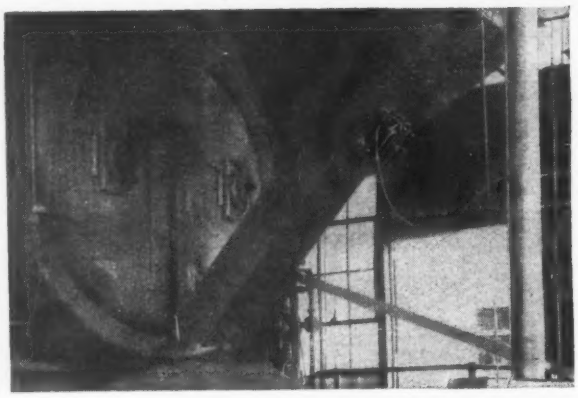

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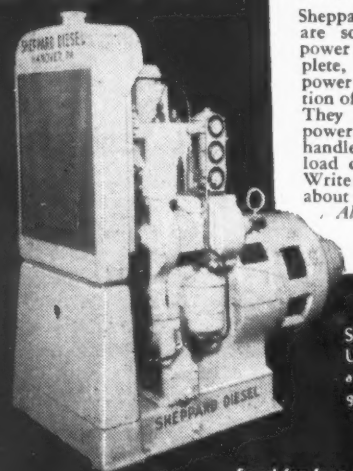

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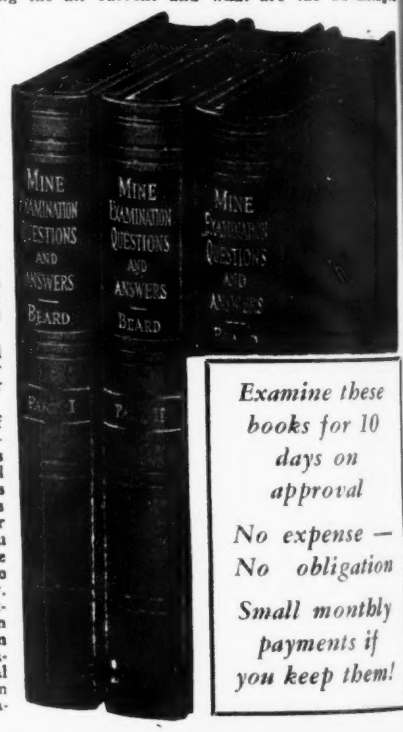

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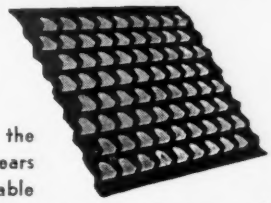

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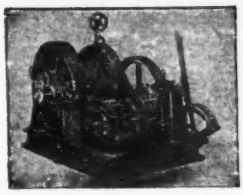

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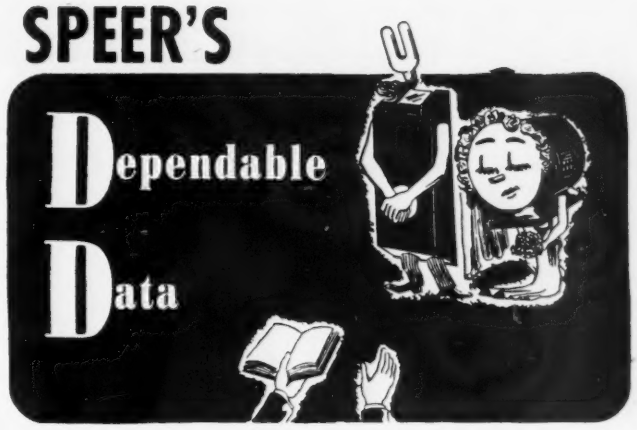

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HP	Make	Type	Volts	RPM
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260	Burke	EMV-65	440	600
260	Burke	EMV-65	2200	600
50	Chand.		220/440	1800
15	West.	CW	220	870

230 V. DC MOTORS

HP	Make	RPM	Type
5	Cr. Wh.	960	CM
5	Cr. Wh.	980	CM
5	Imperial	540	SK
5	Westg	850	
10	Cr. Wh.	825	CM
10	Cr. Wh.	675	CCM
40	West.	850	S-7
50	West.	525	S-12
75	G.E.	600	MP
80	West.	490	76A
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3	15	2200	110/220	Packard
3	15	2200	110/220	Cr. Wh.
2	20	1150/2300	115/230	Maloney
1	20	2300	110/230	West.
2	20	2200/1100	440/220/110	West.
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1	40	1100/220	110/220	Pittsburgh
1	40	2300/1150	115/230	Maloney
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1	50	6600	550/440	Allis Chal.
1	50	2200/1100	220/110	West.
2	50	2200/1100	220/110	Maloney
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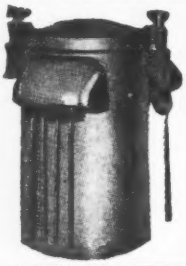

3—1667 KVA 44000-2300/4000Y
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1—**2½ yd. Diesel Northwest Model 80 D dragline.** 80' boom. Built in 1939. Brand new Murphy diesel engine installed 1944. Machine rebuilt 1945.

1—**2¼ yd. Lorain Model 95 dragline.** Caterpillar D17000 diesel engine.

1—**2½ yd. Koehring** 801 changed to 803. Caterpillar D-17000 diesel engine. Shovel and dragline combination.

1—**2½ yd. Northwest Model 8 Dragline.** Twin City Engine. Serial number in 11000s.

1—**2 yd. Bucyrus-Erie diesel dragline Model. E-2,** 60' dragline boom. Serial number in 11000s.

1—**Marion Diesel Model 471 shovel and dragline.** 1¾ yd. for shovel work and 2½ yd. for dragline operation. 80' boom.

1—**2½ yd. Monighan Model 2T.** 80' boom. Charter oil engine.

1—**1½ yd. Diesel Lorain 77 Shovel** and Dragline combination. Serial number in 5100s. Powered by Caterpillar diesel engine D11,000.

1—**1¾ yd. Diesel P&H 775**—extra wide and extra long cats.

1—**Northwest Model 7**—3 yd. lightweight dragline bucket. Very reasonably priced.

1—**2 yd. Bucyrus-Erie Model 2,** diesel dragline, two dragline buckets. 60' boom. Priced right.

1—**2 yd. P&H diesel Page dragline Class 11.** 65' boom.

1—**Lorain 77 diesel crane.** Caterpillar diesel engine.

1—**1½ yd. Northwest Shovel** and Dragline Combination Model 6. 75' dragline boom.

1—**1¼ yd. Northwest Model 5 shovel** and dragline combination. Serial number in 2800s.

1—**1 yd. Lorain 60.** An exceptional buy. Entirely rebuilt. New cab. Waukesha 4-cylinder gas engine. 1 yd. Manganese Dipper.

1—**¾ yd. Diesel Linkbelt Speeder Model B-5.** Serial number in 1150s. Caterpillar D8800 Diesel Engine.

1—**¾ yd. 1939 Diesel Linkbelt Speeder Model B5 Shovel** and Dragline combination. Rebuilt and guaranteed. Caterpillar D8800 Diesel Engine. Brand new tracks.

1—**¾ Marion 331.** Serial number up in 6700s. Condition good. A lot of new parts. A real bargain.

1—**¾ yd. 1941 Koehring Model 251 Shovel.** Crane and Dragline combination.

1—**¾ yd. 1940 Lorain Model 40 shovel,** backhoe and crane combination. Chain Crowd.

1—**¾ yd. Koehring Model 301 shovel** and crane combination.

1—**¾ yd. 1938 General Shovel.** Serial in 1800s.

1—**¾ yd. General "Invincible" Serial in 1600s.** Shovel, Backhoe, Crane-Dragline combination with 6-cylinder Buda gas engine. Exceptionally good condition.

1—**¾ yd. 1941 Koehring Model 303.** Serial number up in 2200s. Backhoe, Shovel, Dragline-Crane with clamshell bucket. Condition excellent. Price reasonable.

1—**¾ yd. 1938 Bay City Model 45 Shovel,** Backhoe and Dragline combination. 45' boom. Fairleads. Price very reasonable.

TRACTORS

3—**D-8 Caterpillar Tractors.** Late Models with 12 yd. scrapers.

1—**International TD-14 Diesel Tractor** with Bucyrus-Erie Angledozer in good condition. Texas location.

1—**TD40 Caterpillar Tractor** with Bucyrus-Erie bull grader, very late model—serial number up in TCC9300s. Texas location.

1—**TD9 International Tractor** with Bucyrus-Erie bull-grader is available in Virginia.

2—**TD18 International Tractors**—late models. Serial number of one in TDR1480s and the second one in TDR1740s. Both with double drum LeTourneau power units.

1—**RD7 Caterpillar Tractor**—serial number in 9G1700s with power unit and LeTourneau UL 9 yd. Scraper—can be purchased for $5900. Southern location.

3—**RD8 Caterpillar Tractor**—serial numbers in IH2900s with double drum power units and YR12 Scrapers. In rather good condition. Available Midwest.

2—**D4 Caterpillar Tractors** with LaPlant-Choate hydraulic bulldozer. Built in 1941 or 1942.

1—**1941 Caterpillar D6 Tractor** with LeTourneau Angledozer—in excellent condition.

SPECIAL

2—**Late model D7 Caterpillar Tractors.** Serial of one in 9G7000s, the second 9G4800s. One is equipped with double drum power control unit and the other with a pusher block.

1—**RD7 Caterpillar wide gauge tractor**—serial number in 9G2400Ws with LeTourneau double drum power unit and LeTourneau bulldozer.

6—**RD8 Caterpillar Tractors** with 12 yd. scrapers. Condition good. Price exceptionally attractive.

2—**Late model D8 Caterpillar Tractors** with 12 yd. scrapers, double drum power units and LeTourneau Bulldozers.

1—**7M Streamlined Caterpillar D7 Diesel Tractor.** Serial number up in 7M1700s with double drum power control unit and LS 10 yd. LeTourneau Scraper.

A Real Bargain.....1—Model FD Diesel Cletrac Tractor—in real good operating condition. Serial number in 6600s. Midwest.

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BARGAINS FOR IMMEDIATE DELIVERY!

Frank J. Wolfe

LOCOMOTIVES

2—15-ton Goodman, type 136-A-O-4-C, 250 volt.
4—13-ton Jeffrey, type MH-110, 250 volt.
8—8-ton General Electric, type HM-822, 250 volt.
9—6-ton General Electric, type HM-801 and HM-823, 250 volt.

All Completely Rebuilt and Guaranteed

ROTARY CONVERTERS

2—500 KW Allis-Chalmers, synchronous type, 250/275 volt DC, 2300 volt AC, complete with transformers, switchboards and all appurtenances.

LOADING MACHINES

1—Myers-Whaley #3 Automat. Just taken out of service. Several 7 and 5-BU Joy Loading Machines.

CUTTING MACHINES

4—29-C Jeffrey Arcwalls, 250 volt DC.
5—29-B Jeffrey Arcwalls, 250 volt DC.

Several 3, 4 and 5-track Steel Tipples.
Electric Hoists from 200 to 1500 H.P.

We specialize in buying complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

COAL MINE EQUIPMENT SALES COMPANY

306-7 BEASLEY BUILDING — L. D. Phone-34 — TERRE HAUTE, INDIANA

ROTARY CONVERTERS

500 KW AL-CH SYN 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
300 KW AL-CH SYN 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal Type 2300/4000 V. Transformers.
300 KW G.E. SYN. 275 V., HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
300 KW G.E. SYN. 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
150 KW WEST. SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.

MOTOR GENERATORS

300 KW G.E. SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.
300 KW G.E., SYN. 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Semi-Automatic Switchgear.
300 KW WEST. SYN., 275 V., 2200/4000/6600 V., 3 Ph., 60 Cy., 900 RPM, Manual Switchgear.
150 KW WEST. SYN., 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.

LOCOMOTIVES

15-T WESTGHSE., 250 V., 908-C Mts., 36"-44" Ga.
15-T WESTGHSE., 500 V., 908-C Mts., 36"-44" Ga.
13-T WESTGHSE., 500 V., 908-C Mts., 36"-44" Ga.
13-T JEFFREY, 500 V., MH-110 Mts., 36"-44" Ga.
13-T JEFFREY, 250 V., 908-C Mts., 36"-44" Ga.
13-T GEN. ELEC. 250 V., HM-829 Mts., 36"-42" Ga.
10-T G.E., 250 V., HM-829 Mts., 36"-42" Ga.
10-T WESTGHSE., 500 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHSE., 250 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHSE., 500 V., 906-C Mts., 36"-44" Ga.
13-T GOODMAN, 500 V., 36-B Mts., 36"-42" Ga.
8-T WESTGHSE., 250 V., 906-C Mts., 36"-44" Ga.
8-T GEN. ELEC., 250 V., 839 Mts., 36"-48" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY
INCORPORATED
501 Grant Building Pittsburgh, Pa.

COAL CUTTING MACHINES

2—35B Jeffrey 250 V., shortwalls.
2—35BB Jeffrey A.C. shortwalls.
2—35B Jeffrey 500 V., shortwalls.
1—124EJ Goodman, 50 HP, 250 V., permissible track mounted slabbing machine.
1—12DA Goodman, 50 HP, 250 V., D.C.
1—29C Jeffrey top cutting arcwall 250 V., D. C.
1—12G3 Goodman, shortwall, 3/60/220V., A.C.
1—12AB Goodman shortwall, 250 V., D.C.
1—36B Jeffrey 250 V., 14" high.

ELECTRIC LOCOMOTIVES

1—13 Ton GE with HM-809 motors.
1—10 Ton Jeffrey with MH-110 250 V. motors.
1—10 Ton GE steel frame, 250 V., with HM-830A motors.
1—10 Ton West. with 907-C motors, 250 V., 42" gauge, bar steel.
1—6 Ton West. bar steel frame, with 904-C 250 V., motors.
2—6 Ton Jeffrey, MH-88 motors, any gauge.
1—6 Ton GE, with HM-823 motors.
2—5 Ton Goodman, 250 V., 36" gauge.
1—4 Ton Jeffrey, with MH-96 motors.

MISCELLANEOUS

1—300 KW GE Syn. M-G Set, 250 V., D.C.
1—165 HP GE Syn. 2200 V., 900 RPM motor.
1—100 KW GE type TCC, Form P, Rotary Converter, 275 V., D.C. with 2300-4000 volt transformers.
1—100 Ton Wheel Press.

TIPPINS MACHINERY COMPANY
Pittsburgh 13, Pennsylvania

MINE HOISTS

1—Vulcan, Band Friction, will coil in excess 5000 ft. 1" rope. 200 H.P. 2200 Volt Motor and Control

1—Wellman, Keyed Drum, 60" Dia. will coil 4500 ft. 1" rope. 200 or 300 H.P. Motor with Magnetic Control.

1—Vulcan, Shaft Hoist, 72" Dia. Suitable 300 ft. Shaft. Motor with control to suit requirements.

1—Nordberg, Shaft Hoist. 72" Dia. Suitable 200 ft. Shaft. 150 H.P. Motor with Control.

1—Vulcan, Cylindro-Conical, Shaft Hoist. Drum 7'-9' Dia. Suitable 350 ft. Shaft. 400 H.P. Motor with Control.

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250 MINE CARS

Composite, electric welded rotary dump type. Toncan steel, white oak bottom. Timken roller bearings, square alloy steel axles, 14" wheels, 4 wheel brakes, Gauge 44". Overall length 131", body 110", width 68", Wheelbase 36". Height above rail 42". Capacity 120 cu. ft. level. Swivel type hitchings.

These cars in service now, are offered subject to release November 1st, located within 20 miles Pittsburgh.

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77—50-Ton Side Discharge Hopper Cars. 1831 cu. ft. capacity. Cast Steel Side Frames

12—40-Ton, 10 cu. yd. Easton-Duplex Dump Cars.

25—40-Ton, 20 cu. yd. Western Automatic Air Dump Cars

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12—Belted 360, 676, 870, 1000, 1300 ft.
12—Diesel 105, 315, 520, 676 & 1000 ft.
6—Electric 1300, 1500, 2200, 5000 ft.

RUBBER CONVEYOR BELTS:
1000', 60". 600', 30". 300', 20". 1000' 42". 900', 48". 1450', 36". 1200', 24". 900', 18". 600', 16". 350', 14".

ELECTRIC LOCOMOTIVES:
15—3, 5, 8 ton Battery & Trolley.

DIESEL GENERATORS:
12—100, 150, 180 & 480 KW.

MINE LOADERS:
17—GD9, Eimco 21, Conway 20, 50, 60 & 75 and Sullivan HL3.

STEEL TANKS:
30—8000, 10,000 & 20,000 gallon capacity.

SHOVELS—DRAGLINES:
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Porter and Vulcan 36" gauge steam saddletank locomotives, 18 and 17 tons, rebuilt.
Baldwin steam locomotives, 58-56 tons, std. ga.
Lima-Shay geared locomotives, 50, 42, 40 tons.
Shovels: 4, 3, 2, 1¼, 1-yd., electric, steam, gas-air, gas-electric.
Draglines, 2-yd. Diesel; 3-yd. electric.
Euclid 6-yd. bottom dump crawler wagons (8).
Rogers 45-50 ton carryall trailer, solids.

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NEW and REBUILT
STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Ton 13" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

PROMPT SHIPMENT FROM OUR WAREHOUSE

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2—35 BB Jeffrey AC shortwall 220/440 v. 3 ph. 60 cy. 6' Bowdil Bar & Chain, any gauge.
2—12 DA 50 HP 250 v. Goodman Shortwall.
Jeffrey Permissible Top Cutter.

STORAGE BATTERY LOCOMOTIVES

2—6 Ton G.E. Permissible Locomotives 36/44" Ga. O.S. armorplate frame. Inside steel tired wheels. 2-HM 825 Ball Bearing Motors. Type LSBE. Class 2C6 Form C9. 13½' long, 50" high, 69" wide and 44" Wheel base.
Each of the above units equipped with Edison Battery 80 cell A-10—one new in 1940, the other in 1939.
1—5 to 5½ Ton Type D Ironton, 36 or 42" Ga.
1—5 Ton Atlas 40" or 44" Ga. with 2 Ball Bearing Motors. Battery box on top of locomotive.
4 Ton 36" Ga. Atlas 2 BB Motors.
4 Ton 36" Ga. G.E. 2 BB Motors.

Haulage & Gathering Locomotives

13 Ton Westgh. 250 v. 36" or 40" Ga.
13 Ton Westgh. Bar Steel 500 v. 40/42".
10 Ton Jeffrey 500 v. 36/42" Ga.
2—6 Ton G.E. 500 v. 42/44" Ga.
2—6 Ton G.E. 250 v. 42/44" Ga. HM 801 BB Motors, gath.
2—5 Ton 30B Goodman 250 v. 36" Ga. elec. reel.
1—5 Ton Morgan Gardner 250 v. 36/42" Ga. gath.

SCREENS

2—4" x 5' single deck Tyler Hummer Screens. Type 37 equipped with V-16 Vibrators No. 2860 and 2867 designed for 110 v. AC 15 cy.

Rotary Con. & MG Sets (3 ph. 60 cy.)

2—300 KW G.E. HC 12 Rotary 275 v. 6 ph. with—3—125 KVA G.E. 2300 v. 1 ph. 60 cy. Trans.
150 KW Ridgway 275 v. 900 RPM dir. con. 225 HP Ridgway Syn. Motor 2300 v. complete.
100 KW Ridgway, 250/275 v.—150 HP Ridg. Syn. 220/440 v. 1200 RPM with AC & DC Panels.
75 HP 220/440 v. West. CS 900 RPM Motor.
50 KW Cro. Whe. 250 v. 900 RPM dir. con.
35 KW 125 v. S West —54 HP West. 220/440 v.

ENGINE GENERATOR & TURBINE SETS

65 HP Primm Oil Engine belted to AC or DC Gen.
57.5 KVA Allis Chalmers Gen. 220/3/60—Kerr Tur.
50 KW West. 125 v. DC—Skinner Engine.
50 KW 125 v. DC West. Turbo Gen.

TRANSFORMERS

Qu.	KVA	Prl. V.	Sec. V.
31	7½	2200	220/440
28	10	2200	220/440
3	50	22000	2200
2	25	2200	110/220
1	37½	2200	110/220
1	40	2200	110/220
1	50	2200 v.	440/220

HOISTS

100 HP Lidgerwood sgl. fr. drum geared to 100 HP G.E. slip ring 220/440 v. 3 ph. 60 cy. MTC. Rev. drum & resistance.
50 HP Thomas sgl. fr. drum 26" x 25"—4" figs.
40 HP Lidgerwood sgl. fr. drum geared to 40 HP G.E. slip ring 220/440 v. 3 ph. 60 cy. MTC. Rev. drum & resistance.
30 HP Carlin double dr. fr. 13" x 18"—5½" figs.
10 HP Diamond sgl. fr. drum geared to 10 HP G.E. 220/440 v. 3 ph. 60 cy. Motor.
10 HP Hoist sgl. fr. dr. 22" Face 12" dia. 7" figs. dir. con. 10 HP AC Motor.
The above Hoists can be equipped with AC or DC Motors.

COAL CRUSHERS

18 x 24 and 18 x 30 New Scottdale dbl. roll.

SLIP RING & SQ. CG. MOTORS

HP	Make	Speed	WDG	Type
300	West.	1750	S.R.	CW
200	G.E.	250	S.R.	MT 412
150	G.E.	600	S.R.	I-M
150	G.E.	600	S.C.	I-L
150	West.	580	S.R.	CW
100	West.	1750	S.R.	CW
100	G.E.	500	S.R.	M1-25 cy.
40	West.	1200	S.C.	CS587C
40	G.E.	900	S.R.	MTC
25	West.	575	S.R.	CW
20	West.	1200	S.C.	CS
20	West.	900	S.C.	CS
75	West.	900	S.C.	CS
75	G.E.	720	S.C.	I-K
50	West.	870	S.C.	CS
15	West.	1750	S.C.	BB

Other sizes down to 1 HP

DC Motors and Generators 230/250 V.

HP	Make	Speed	WDG	Type
175	G.E.	475	ser.	MD 109
150KW	Cr. Wh.	550	cp.	
130	G.E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
60	Cr. Wh.	800	cp.	
50KW	Cr. Wh.	1050	cp.	
50	Reliance	1500		185T
20	West.	1750		
40	Roth	1500		SK 80L

PUMPS

4" suc. 4" dis. Lee Courtney Cent.—dir. con. 40 HP AC or DC Motor.
100 GPM 300' Head F. M. 2 stage, with 15 HP F.M. Motor 220/440 v. Motor.

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9" x 8" Chg. Pneu. Type NSB 175 cu. ft. 100#.

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32,000' of Belt Remaining With Idlers, Pulleys, and Drives

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Electric Motors, Line Equipment, Transformers, and Supplies
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Marcy Rod Mill, 8' x 12'
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Dorr Rake and Bowl Classifiers
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Pumps: Centrifugal, Deep-well, Steam, Dredge
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LOCOMOTIVES

1—4-Ton Westinghouse, type 902, 250 volt, 42" gage
1—5-Ton Goodman, Type 2600-R, 250 volt, 44" gage, with extra arm
1—6-Ton Goodman, Type 30-C, 250 volt, 42" gage
1—8-Ton Goodman, Type 32-0-4-T, 250 volt, 42" gage

CUTTING MACHINES

1—29-C Jeffrey Arcwall, 44" gage, 250 volt
1—29-C Jeffrey Arcwall, 42" gage, 250 volt
1—29-B Jeffrey Arcwall, 44" gage, 250 volt
2—12-AA Goodman Shortwall, 250 volt, 42" gage
1—12-AB Goodman Shortwall, 250 volt, any gage
2—35-L Jeffrey Shortwall, 220/440 volt A.C.
1—CR-2 Sullivan, Shortwall, 250 volt, 44" gage
1—CR-8 Sullivan Shortwall, 250 volt, no truck
1—CE-7 Sullivan, 250 volt, 44" gage truck

SUBSTATIONS

1—75-KW. G.E. M-G Set complete, 275 volt generator, 2300/4000 volt Induction motor, complete with switchboard.
1—80-KW Westinghouse M-G Set complete, 275 volt generator, 2300 volt Synchronous Motor, complete switchboard.
1—100-KW G.E. Rotary converter outfit, 275 volt.
1—200-KW. G.E. Rotary converter outfit complete with 2300 volt transformers and complete switchboard including automatic breaker.
1—300-KW. G.E. Rotary converter with 6900 volt transformers and complete switchboard with automatic circuit breaker.

MISCELLANEOUS

1—150-HP. Ottumwa hoist with 1¼" rope, 220/440 volt motor and reversible control, complete with hydaulic break, suitable for slope or shaft.
1—#3 Cincinnati milling machine complete with Lima drive.
1—18" x 125' LaDel underground belt conveyor practically new, can be extended to 800 or 1000 feet, equipped with D.C. permissible motor and magnetic starter.
1—Sullivan bit sharpening machine with oil heating furnace.

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6600 Ft. 26 in. 5 Ply.
2175 Ft. 60 in. 10 Ply.

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All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

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LOCOMOTIVES

Goodman: All 250 volts.
1—10 ton, 31 1-4-T.
1— 6 ton, 30B, 43" 1—5 ton.
1— 5 ton, W-1-2, 36".
2— 5 ton, 2600 K.
1— 6 ton, 33-1-4-T.
2— 8 ton, 32-1-4-T.
2—15 ton 29A, 48" gauge.

Westinghouse: All 250 volt.
1—4 ton, 902, 48".
1—904 c. 44" 500 volt. Also 906 motors.
1—10 ton, 915.
Bar steel frames 10 ton, 6 ton, and 4 ton.

G.E.: All 250 volt,
6 ton 803, 44" as is
6 ton 823, 44"
6 ton 801
8 ton 839
4 ton 1022, 44" as is
5 ton 825, 44" & 36"
8 ton 839 motors
Battery Locomotives G.E., Ironton and Atlas.

Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt. 8 ton and 10 ton.

MINING MACHINES

Jeffrey, 35B and 4—28A, 250 V. 4—29B, 29C, 29CE with shearing head.
Revolving head for 29C.
35BB **Jeffrey** mining machine.
1—35 BB AC 220 volt.
Goodman, 12A, 12AB, 12AA, 12G3A, 24B.
1—12G3 250 volt and 2—112 DA, 500 volt.
2—Permissible Type 12CA. 6—112AA.
2—124 E.J.
Motors for 212AA, both 250 and 500 v.
Sullivan, CE7, CE9, CE10. CR10 Low Vein. CR5 for middle cutting.

SUBSTATIONS—275 volts, D. C.

2—200 KW **G.E.** Rotaries (600 volt).
2—150 KW **West.** Rotary.
1—200 KW 1—100 KW **Ridgway** M-G Sets.
2—100 KW **G.E.** Rotary.
1—200 K W **Westinghouse** M-G Set 900 RPM, 2300-275 volt.
1—100 KW **Westinghouse** M-G Set.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 12AB,, 12AA, 33-1-4-T, 31-1-4-T. **General Electric** 801, 803, 819, 821, 825, 839. **Westinghouse** 904, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse Rotary Converter Armature,** 250 V Bracket Type, 150KW G E, HCC Bracket Type, and 150 KW G. E., TC Pedestal Type.

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24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
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20"	4	1/8"	1/32"
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